SUMMARY OF REMEDIATION PROJECTS AT PLANT 4 VOLUME 1 OF 2 NAS FORT WORTH TX

1/15/1994

ENVIRONMENTAL SCIENCE AND ENGINEERING

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NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

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DRAFT REPORT

Summary of Remediation Projects at Air Force Plant 4 and Carswell Air Force Base

Volume 1

Prepared for:

U.S. Army Engineer District
Ft. Worth, Texas

1/15/94

Prepared by:

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Engineering, Inc.

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LIST OF FIGURES

AFB4	Air Force Plant 4
AFBDA	Air Force Base Disposal Agency
AFCEE	Air Force Center for Environmental Excellence
AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirements
BNA	base/neutral organic compound
BSS	Base Service Station
BTEX	benzene, toluene, ethylbenzene, and xylene
CAFB	Carswell Air Force Base
CAMD	constitutive aerobic microbia degradation
CQCP	Contract Quality Control Plan
DCE	dichloroethene
12DCE	1,2-dichloroethene
DD	decision documents
DNAPL	dense, nonaqueous-phased liquid
DOD	U.S. Department of Defense
DP12	Chrome Pit No. 3
DP13	Die Yard Chemical Pits
EPA	U.S. Environmental Protection Agency
ESE	Environmental Science & Engineering, Inc.
FDTA 5	Fire Department Training Area No. 5
FDTA 6	Fire Department Training Area No. 6
FFA	Federal Facilities Agreement
FR	Federal Register
FS	feasibility study
FSA-1	Fuel Saturation Area No. 1
FSA-3	Fuel Saturation Area No. 3

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued, Page 2 of 4)

FSATP	field sampling, analysis, and testing plan
ft	foot
ft-bls	feet below land surface
FTA-2	Fire Training Area No. 2
FW	Fighter Wing
GAC	granular activated carbon
gal	gallon
GD	General Dynamics
GOCO	government-owned/contractor-operated
gpm	gallons per minute
HDPE	high-density polyethylene
HP	horsepower
IRA	interim remedial action
IRP	Installation Restoration Program
IRPIMS	Installation Restoration Program Information Management System
lb	pound
LF01	Landfill No. 1
LF03	Landfill No. 3
LF04	Landfill No. 4
LF05	Landfill No. 5
MCL	maximum contaminant level
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
MMD	methanotrophic microbial degradation
NFA	No Further Action
NOV	Notice of Violation
NPL	National Priorities List

O&M	operation and maintenance
OU	operable units
OVA	organic vapor analyzer
PDW	permeable dehalogenation wall
PID	photoionization detector
POL	petroleum, oil, and lubricant
ppm	parts per million
PRG	preliminary remedial goal
QA/QC	quality assurance/quality control
QAMP	Quality Assurance Management Plan
QC	quality control
RA	risk assessment
RACER	Remedial Action Cost Estimating and Requirements
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RD	remedial design
R_I	radius of influence
RI	remedial investigation
ROD	Record of Decision
SOW	Statement of Work
St. 5	Stormwater No. 5
ST14	Tank Farm
SVEPP	soil vapor extraction pilot plant
SVOC	semivolatile organic compound
SWMU	solid waste management unit
TCE	trichloroethene
TDH	Texas Department of Health

TMV	toxicity, mobility, and volume
TPH	total petroleum hydrocarbons
TWC	Texas Water Commission
µg/kg	micrograms per kilogram
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
UST	underground storage tank
UV	ultraviolet
WP07	Waste Burn Area
WPAFB	Wright-Patterson Air Force Base
yd^3	cubic yards

1.0 INTRODUCTION

This draft report was prepared by Environmental Science & Engineering, Inc. (ESE) under the U.S. Army Corps of Engineers (USACE) Contract No. DACW63-93-D-001, Delivery Order No. 3. Delivery Order No. 3 is entitled "Feasibility Study and Recommendations for Remediation of the TCE Plume, Carswell AFB, Plant #4, Ft. Worth, TX" and consists of seven separate tasks.

This report specifically addresses the requirements for Task 2. The overall goal of Task 2 is to summarize all remedial action projects which have been implemented at Carswell Air Force Base (CAFB) and Air Force Plant 4 (AFP4). The specific requirements for Task 2 are presented in Section 2.0 of this report. The following sections summarize the remedial action activities conducted at AFP4 and CAFB.

1.1 SITE HISTORY--AFP4

AFP4, a government-owned/contractor-operated (GOCO) facility, is an aircraft manufacturing plant located in Tarrant County, Texas, 7 miles northwest of the City of Fort Worth. The facility has been in operation since 1942 and currently produces F-16 aircraft, radar units, and various aircraft and missile components.

Historically, the manufacturing processes at AFP4 have generated an estimated 5,500 to 6,000 tons of waste oils, solvents, paint residues, and spent process chemicals per year. These wastes were disposed of onsite by burial in landfills, burning, or discharge into pits or the sanitary sewer system. A waste treatment plant was constructed in the early 1970s to treat the process chemical solutions, rinse waters, and other waste waters, and solvents. Some wastes, such as paint residues and process cyanide solutions, were later disposed of offsite by a contractor, but waste oils and fuels continued to be disposed of in onsite landfills or burned in fire training exercises. During the late 1970s, the burning of fuels for fire training was phased out, and all waste oils and recoverable solvents have

since been disposed of offsite by a contractor. Currently, through waste minimization techniques, the offsite disposal of wastes is less than 2,500 tons per year.

Potential contamination at AFP4 was first noticed by a private citizen in September 1982. General Dynamics (GD) was notified and took immediate action. The source of the observed contamination was thought to be leachate from a landfill. In October 1982, GD began construction of French Drain No. 1 to prevent migration of contaminated groundwater toward Meandering Road Creek.

Since the recognition of initial contamination, the U.S. Department of Defense (DOD) has taken actions to locate and identify past disposal sites and to eliminate the resultant potential contaminant hazards to public health in an environmentally sound manner via the Installation Restoration Program (IRP) (Intellus, 1986). The IRP is a four-phase program, consisting of the following:

- Phase I--problem identification,
- Phase II--confirmation,
- Phase III--technology development, and
- Phase IV--planning and implementation of appropriate control measures.

The IRP for AFP4 was initiated in March 1984 with the completion of a Phase I records search. At the time of the records search, a total of 20 disposal sites was identified by the contractor performing the work. On October 15, 1984, AFP4 was proposed for inclusion on the National Priorities List (NPL) 49 Federal Register (FR) 40320. In December 1987, the U.S. Air Force (USAF), completed a Phase II Report Confirmation/Quantification Study which documents the presence of hazardous substances in soil and groundwater. On September 4, 1990, USAF, the U.S. Environmental Protection Agency (EPA) Region VI, and the Texas Water Commission (TWC) signed a Federal Facilities Agreement (FFA).

Table 1.1-1 identifies information on the 21 FFA sites, 9 additional IRP sites (not included in the FFA), and 2 Areas of Concern (AOCs).

Under Section XI of the FFA, USAF agreed to undertake, seek adequate funding for, fully implement, and report on the following tasks:

1. Remedial investigations (RIs) of the 21 sites identified in the FFA;
2. Feasibility studies (FSs) for the 21 FFA sites;
3. All response actions, including operable units (OUs), for the 21 FFA sites; and
4. Operation and maintenance (O&M) of response actions at the 21 FFA sites.

The following remedial actions have been undertaken at AFP4 to reduce or control known contamination:

1. **Landfill No. 1 (LF01), IRP Site No. 1**--In 1982, when contaminants were identified in water samples collected from a storm drain in the vicinity of LF01, French Drain No. 1 was constructed to redirect this flow into a catch basin. French Drain No. 1 is currently connected to a carbon adsorption treatment system at Fuel Saturation Area No. 1 (FSA-1). In 1983, 11,000 cubic yards (yd^3) of contaminated soils were removed from LF01 to reduce a contaminant source. In 1985, French Drain No. 2 was constructed to intercept contaminated groundwater. The groundwater from French Drain No. 2 is currently treated at FSA-1.
2. **Fire Department Training Area No. 6 (FDTA 6), IRP Site No. 9**--In 1982 and 1983, an interim soil removal action was conducted to eliminate a source of contamination. The volume of soils removed during this action is unknown.
3. **Chrome Pit No. 3 (DP12), IRP Site No. 12**--In 1983, an interim soil removal action was conducted to eliminate a source of

Site No.	WIMS-ES Site ID	Alias	Site Class	Description	Material Disposed of	Date of Operation	Status	Regulatory Mechanism
1	LF01		IRP Site	Landfill No. 1	Drums of unspecified liquid wastes, solvents, thinners, paint wastes, burned oils & fuels, rubble, plaster, lumber, suspected wastes include: magnesium wastes, chromate sludges, cyanide	1942-1966	In PA/SI process 18) 21	CERCLA
2	LF02		IRP Site	Landfill No. 2	Construction rubble, plasters, lumber, tires	early 1940s-early 1960s	NFA Document 1990	Awaiting regulatory concurrence
3	LF03		IRP Site	Landfill No. 3	Hazardous liquid wastes of mixed oils & solvents fill dirt & rubble	1942-1945 1945-1966 inactive 1966-1977	PA/SI/RI/FS process	CERCLA
4	LF04		IRP Site	Landfill No. 4	Construction rubble, small quantities of solvents, oils fuels, thinners	1956-early 1980	Originally NFA Recommended/ PA/SI/RI/FS process	CERCLA
5	FT05	FDTA No. 2	IRP Site	Fire Department Training Area No. 2	Waste oils, fuels	1955-1956	PA/SI/RI/FS process	CERCLA
6	FT06	FDTA No. 3	IRP Site	Fire Department Training Area No. 3	Waste fuels, oils	mid 1960s	NFA Recommended	Awaiting regulatory concurrence
7	FT07	FDTA No. 4	IRP Site	Fire Department Training Area No. 4	Waste oils, fuels	late 1960s	NFA Recommended	Awaiting regulatory concurrence
8	FT08	FDTA No. 5	IRP Site	Fire Department Training Area No. 5	Waste fuels, oils unspecified chemicals	mid 1960s	PA/SI/RI/FS process	CERCLA
9	FT09	FDTA No. 6	IRP Site	Fire Department Training Area No. 6	Waste fuels, oils	late 1950s-1980	PA/SI/RI/FS process	CERCLA
10	DP10		IRP Site	Chrome Pit No. 1	Miscellaneous liquid and solid chemical waste, chrome waste	early 1940s	NFA Recommended 1990	Awaiting regulatory concurrence
11	DP11		IRP Site	Chrome Pit No. 2	Miscellaneous liquid & solid waste, chromate solutions	mid 1940s	NFA recommended 1990	Awaiting regulatory concurrence
12	DP12		IRP Site	Chrome Pit No. 3	Chromate, barium-chromate sludge, dilute metal solutions, drums of unidentified liquids	1957-1973	PA/SI/RI/FS process	CERCLA
13	DP13		IRP Site	Die Yard Chemical Pits	Chromate sludges, metal solutions, other chemical wastes	1956-1962	PA/SI/RI/FS process	CERCLA
14	SS14	FSA No. 1	IRP Site	Fuel Saturation Area No. 1	Fuels, JP-4	mid 1970s-early 1980s	PA/SI/RI/FS process	CERCLA

Table 1.1-1
Site Summary Table For Air Force Plant 4

SOURCES: MAP, 1992.

contamination. A total of 8,900 yd^3 of contaminated soils was removed with this action.

4. **Die Yard Chemical Pits (DP13), IRP Site No. 13**--In 1984, an interim soil removal action was conducted to eliminate a source of contamination. A total of 1,100 yd^3 of contaminated soils was removed.

5. **Fuel Saturation Area No. 3 (FSA-3), IRP Site No. 17**--In June 1992, an interim vapor extraction unit was installed at FSA-3. In October 1992, an interim pump and treat system became operational at the site. The interim vapor extraction unit was taken out of service in November 1992.

6. **Landfill No. 3 (LF03), IRP Site No. 3**--A dense, nonaqueous-phased liquid (DNAPL) recovery system was installed at LF03 to collect free product (October 1992). The free product generated under this remedial action was transferred offsite to a regulated hazardous waste disposal facility.

7. **FSA-1, IRP Site No. 14**--An interim groundwater pump and treat system was installed to recover free product and control the movement of contaminated groundwater. A vacuum extraction system was put into service in December 1992.

8. **East Parking Lot/Flightline Area (Window Area), IRP Site No. 22**--The interim remedial action (IRA) at this site involves pumping and treating contaminated groundwater in the East Plume. The objective of this IRA is to prevent further transmission of contaminated groundwater to the Paluxy aquifer. The IRA at this site is scheduled to be operational in March 1994.

9. **Assembly Building/Parts Plant-181 (Building 181) AOC Site (no number defined)**--A soil vacuum extraction pilot study is currently being performed at this site to evaluate the removal of trichloroethene (TCE) from soils beneath Building 181. It is anticipated that at completion of the pilot study, the vacuum

extraction system may be modified or expanded and remain operational to optimize removal of TCE. Groundwater is also being treated in Building 181.

10. **Underground storage tank (UST) Sites**--Numerous USTs have been removed from AFP4, along with associated contaminated soils.

1.2 SITE HISTORY FOR CAFB

CAFB was selected for closure and associated property disposal during Round II Base Closure Commission deliberations. The base closed on October 31, 1993. However, within this report, the site will still be referred to as CAFB.

Wastes were generated and disposed of at CAFB since the beginning of industrial operations in 1942. Major industrial operations included maintenance of jet engines, aerospace groundwater equipment, fuel systems, weapon systems, and pneumatic systems; maintenance of general and special purpose vehicles; aircraft corrosion control; and nondestructive inspection activities. The generated wastes were primarily oils, lubricants, recoverable fuels, spent solvents, and cleaners.

The IRP was initiated at CAFB in 1984 and began with a program records search. IRP studies focused on identifying and characterizing waste disposal areas on the installation.

CAFB currently has 20 IRP sites. A Phase I records search conducted in 1984 identified 15 sites requiring further action. An additional five sites were identified since then through subsequent IRP investigations and other base activities. Thirteen of these sites are also Resource Conservation and Recovery Act (RCRA) solid waste management units (SWMUs). Table 1.2-1 provides a brief description of these sites.

Interim remedial actions to reduce or control known contamination have been conducted as emergency removals at two IRP sites; interim remedial actions have

Table 1.2-1 **Site Summary Table**
Page 1 of 2

Site No.	WIMS-ES Site ID	OU	Alias	Site Class	Site Title	Material Disposed of	Operation	Status	Regulatory Mechanism
1	LF01	2	SWMU 28	IRP Site	Landfill 1	Unknown	1942-1989	Analytical data suggests solvent and metal-bearing wastes. No significant risk. Under consideration for no further action	RCRA
2	LF02	N/A	N/A	IRP Site	Landfill 2	Construction rubble and materials	1952-1956	No action per RCRA Facility Assessment March 1989	RCRA
3	LF03	N/A	N/A	IRP Site	Landfill 3	Construction rubble, fill area and small amount of hazardous waste	1950-1952	No action per RCRA Facility Assessment March 1989	RCRA
4	LF04	1	SWMU 22	IRP Site	Landfill 4	Paint, thinners, strippers, cadmium batteries, waste solvents burned wastes	1956-1973	RD canceled December 1991	RCRA
5	LF05	1	SWMU 23	IRP Site	Landfill 5	All types of flightline waste and refuse. TCE regularly burned	1963-1975	RD canceled December 1991	RCRA
6	LF06	1	SWMU 62	IRP Site	Landfill 6	Construction rubble and possible drums of hydraulic fluid	1975-1978	RI	RCRA
10	WP07	1	SWMU 24	IRP Site	Waste Burial Area	Buried drums containing cleaning solvents and leaded sludge from flightline	1960s	RD canceled December 1991	RCRA
11	FT08	N/A	SWMU 18	IRP Site	Fire Training Area No. 1	Waste oils and fuels were burned	Prior 1963	NFA - 17 December 1991	RCRA
12	FT09	1	SWMU 19, 20, 21	IRP Site	Fire Training Area No. 2	Waste oils and solvents were burned. Unused JP-4 was observed	1963-1989	RA	RCRA

SOURCES: MAP, 1993; ESE.

Table 1.2-1 **Site Summary Table**
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Site No.	WIMS-ES Site ID	OU	Alias	Site Class	Site Title	Material Disposed of	Operation	Status	Regulatory Mechanism
13	SD10	1	SWMU 53	IRP Site	Flightline drainage ditch	Petroleum, aircraft soap and oils have migrated from flightline	Unknown construction date but used to present	RA	RCRA
14	WP11	N/A	N/A	IRP Site	Pesticide rinse area	Rinse water from pesticide spray equipment	Unknown start up date. No longer in use	No action per RCRA Facility Assessment - March 1989	RCRA
15	OT12	N/A	SWMU 63	IRP Site	Entomology dry well	Pesticide and herbicide contaminated rinse water	1965-1981	NFA - 17 December 1991	RCRA
16	SD13	2	SWMU 64, 67	IRP Site	Unnamed stream	Hydrocarbons	1965-Present	Focused RI	RCRA
17	ST14	1	SWMU 68	IRP Site	POL Tank Farm	JP-4	Early 1960s	RD	RCRA
N/A	OT15	3	SWMU 60	IRP Site	WSA	Radium	1957-1969	Being monitored. Programmed for IRA	RCRA
N/A	ST16	2	N/A	IRP Site	Base Service Station	Hydrocarbons	Early 1970s	RI/FS	CERCLA/ PST
N/A	OT18	1	N/A	IRP Site	Airfield groundwater	JP-4		RI	CERCLA
N/A	DP17	1	N/A	IRP Site	Waste oil dump	Oils, solvents, unknown		RI	CERCLA
N/A	OT15	N/A	SWMU 65	IRP Site	WSA disposal site	Waste cleaner, solvents, and thinners, TCE	Unknown	NFA - 17 June 1991	RCRA
N/A	N/A	2	N/A	IRP Site	East area groundwater	Metals and hydrocarbons, possible solvents		Unknown	RCRA

N/A = Not applicable.

SOURCES: MAP, 1993; ESE.

been conducted at two other sites. A third action is being conducted at Landfills No. 4 and 5 (LF04 and LF05):

1. **Waste Burial Area (WP07) (SWMU No. 24), IRP Site No. 10**--Site WP07 is a waste burial area that contained drums of cleaning solvents and leaded sludge. The drums and associated contaminated soil were removed in 1991.
2. **Petroleum, Oil, and Lubricant (POL) Tank Farm (ST14) (SWMU No. 68), IRP Site No. 17**--Phase II investigations of the POL tank farm (Site ST14) revealed the presence of free product JP-4 on the surface of groundwater. A skimmer was installed on a well in August 1991; the skimmer yielded no free product. The skimmer was scheduled for removal in 1993.
3. **Flightline Drainage Ditch (SWMU No. 53)**--The Flightline Drainage Ditch receives runoff from the flightline area and discharges from the aircraft washracks and the Fuel System Shop. In 1993, 700 yd^3 of contaminated soils were excavated from the site. A culvert and concrete liner were subsequently installed in the ditch.
4. **Fire Training Area No. 2 (FTA-2, SWMU Nos. 19, 20, 21)**--Results of soil sampling and analysis during the RI/FS studies indicated that several organic constituents occurred in soils at this site. Approximately 5,700 yd^3 of contaminated soils were excavated from this site. The excavated soils are currently being treated onsite.
5. **LF04 and LF05 [LF04 (SWMU No. 22) and LF05 (SWMU No. 23)], IRP Sites No. 4 and 5**--A groundwater pump and treat system was installed at this site in 1993 for the purposes of preventing further migration of contaminated groundwater.

2.0 RECORDS REVIEW

The Statement of Work (SOW) for Task 2 specifies that a review be performed of all available pertinent information concerning projects that were/are commissioned to remediate environmental contamination resulting from activities at CAFB and/or AFP4 and that a report summarizing this information be prepared.

To accomplish the objectives for Task 2, two ESE professionals (one geologist and one engineer) visited several locations to collect information pertinent to preparing the specified report. The following items list the location and time of site visits:

1. Wright-Patterson Air Force Base (WPAFB) October 12 through October 14, 1993, to collect information pertinent to AFP4;
2. Federal Building, Ft. Worth, Texas, October 19 and 20, 1993, to collect information pertinent to CAFB; and
3. CAFB, Ft. Worth, Texas, October 20, 1993, to collect information pertinent to CAFB.

Tables 2.0-1 and 2.0-2 list all reports that were reviewed as part of the records review conducted for Task 2.

The SOW specifies that details of the following information elements be included in this Task 2 report:

1. Remediation project objectives,
2. Remediation accomplishments/results,
3. Data/information developed as a result of the project,
4. Recommendations for additional studies and/or remediation projects resulting from the project,
5. Status of the project,
6. Schedule (if ongoing),

Table 2.0-1. Reports Reviewed as Part of Records Review for AFP4

Title	Date	Author
* Specifications for Waste Disposal Project - West Parking Lot.	6/30/83	General Dynamics
* Assessment of French Drain Pumpage.	12/06/85	Hargis & Associates
* Three-Site RAP Review action Items, Attachment A Design Basis and Preliminary Calcs. for Conceptual Design of Alt. 4, Onsite Contaminated GW Trt. and Discharge to AFP4 Process Water Makeup System.	7/16/86	Intellus Corporation
* Draft RAP and Conceptual Documents for Fuel Saturation Areas No. 1 & 3.	7/31/86	Intellus Corporation
* Construction Site Assessment Report for the Die Yard Zone.	1/30/87	Intellus Corporation
* Evaluation of Condensor Water Pipeline and Interim Remedial Measures Fuel Saturation Area No. 3.	7/15/88	Hargis & Associates
* Engineering Report Remedial Action for Fuel Saturation Areas 1 and 3 and treating leachate of French Drain No. 1.	3/02/89	General Dynamics
* Prelimminary Assessment/Site Inspection and Remedial Investigations/ Feasibility Studies, Waste Management Plan, AFP4.	12/03/90	U.S.Department of Energy
* Groundwater Remediation of Window Area -100% Design Package.	9/93	International Technology
* East Parking Lot, Installation of Groundwater System.	8/93	International Technology
* Draft Final Feasibitliy Study.	5/93	Chem Nuclear Geotech, Inc.
* Design Plan for Subsurface Barrier Wall at Landfill No. 3.	3/93	International Technology
* Groundwater Remediation of Window Area-50% Design Package.	3/93	International Technology
* Draft Contract QC Plan Addendum, GW Remediation, Window Area.	10/92	International Technology
* Alternatives for East Plume Groundwater Remediation.	12/91	Tyndall AFB

Source: ESE, 1994.

Table 2.0-2. Reports Reviewed as Part of Records Review for CAFB

Title	Date	Author
* IRP Stage 2 Draft Feasiblity Study for the East Area.	5/01/91	Radian Corporation
* IRP Stage 2 CAFB Final Report. Feasibility Study for Flightline Area.	10/01/91	Radian Corporation
* CAFB RCRA Permit, Part B # HW50289. Investigation/Remediation Plans. SWMU No. 16, 32, 35, 36, 61.	1/31/91	USACE Ft. Worth Dist.
* CAFB RCRA Permit, Part B # HW50289. Preliminary Remedial Action Plans. SWMU No. 16, 22, 23, 24, 32, 35, 36, 61, 68.	9/09/91	USACE Ft. Worth Dist.
* CAFB RCRA Permit, Part B # HW50289. Draft Investigation/Remediation Removal of Buried Drums and an Underground Storage Tank. SWMU No. 24, Waste Burial Area.	1/31/91	USACE Ft. Worth Dist.
* IRP Site 12 FinalReport. 90% Plans & Specifications for the Remediation of the Fire Department Training Area 2, IRP Site 12.	6/01/91	Radian Corporation
* Decision Documents and No Further Action. (Compilation of IRP RI/FS.		Radian Corporation
* Decision Papers Site 13, Flightline DitchDP, WSA, Base Service Sta., Site 12, Site 11, Ent., etc.	4/90	Radian Corporation
* POTW Discharge Permit.	10/93	International Technology
* Management Action Plan.	3/93	U.S. Army Corps of Engineers
* 90% Design Cost Estimates - Site SD10.	6/91	Radian Corporation
* 90% Plans and Specifications - Site SD10.	6/91	Radian Corporation
* 90% Design Cost Estimate - Site 12.	6/91	Radian Corporation
* Summary of Permit Sites.	5/91	U.S. Army Corps of Engineers

Source: ESE, 1994.

7. Whether or not information derived is in the Installation Restoration Program Information Management System (IRPIMS), and
8. Discrepancies between various project reports and recommendations as to the most reasonable resolution of the discrepancies.

Tables 2.0-3 and 2.0-4 list those reports which were considered by ESE to present information relevant to the task goals. Information from these reports is summarized in Section 3.0 and detailed in Appendices A and B.

Table 2.0-3. Reports Considered Relevant to AFP4 (Continued, Page 2 of 3)

Title	Date	Author	ESE Reference
* Draft Decision Paper for Landfill No. 2 Site.	9/30/90	U.S. Department of Energy	
* Draft Decision Paper for Chrome Pit No. 1 Site.	9/30/90	U.S. Department of Energy	
* Draft Decision Paper for Chrome Pit No. 2 Site.	9/30/90	U.S. Department of Energy	
* Draft Decision Paper for Fire Department Training Area No. 4 Site.	9/30/90	U.S. Department of Energy	
* Preliminary Water Quality Monitoring Plan.	10/31/90	U.S. Department of Energy	
* IRP Stage 2, Site Characterization Report for Flightline Area, CAFB.	11/30/90	Radian Corporation	
* Prelimminary Assessment/Site Inspection and Remedial Investigations/ Feasibility Studies, Waste Management Plan, AFP4.	12/03/90	U.S.Department of Energy.	Yes
* Draft Final GW Quality Monitoring Report, 1/92, prepared for HQ Dept of AF, Aeronautical Systems Division, Wright-Patterson AFB, VOLs 1-5.	1/31/92	Chem-Nuclear Geotech, Inc.	
* Water Quality Data, 5/85-to 5/86.	8/15/86	Hargis & Associates	
* Water Quality Data, 5/86-5/87 App. A-C.	8/05/87	Hargis & Associates	
* Water Quality Data, 5/86-5/87 App. D-G.	8/31/87	Hargis & Associates	
* Final Work Draft Plan, Remedial Investigation & Feasibility Study (Text)	1/31/89	Hargis & Associates	
* Final Draft Work Plan, Remedial Investigation and Feasibility Study, App. C-I.	1/31/89	Hargis & Associates	
* Final Draft Work Plan, Remedial Investigation and Feasibility Study (Figures).	1/31/89	Hargis & Associates	
* Water Quality Data, 5/87-1/89, App. A.	4/20/89	Hargis & Associates	
* Water Quality Data, 5/87-1/89, App. B-G.	4/20/89	Hargis & Associates	
* Draft Annual Hydrologic Monitoring Plan.	7/19/89	Hargis & Associates	
* Summary of Interim Remedial Investigations, 1/87-4/89. Text, Tables, and Illustrations.	7/19/89	Hargis & Associates	
* Summary of Interim Remedial Investigations, 1/87-4/89. App. A-F.	7/19/89	Hargis & Associates	
* Summary of Interim Remedial Investigations, 1/87-4/89. App. G-L.	7/19/89	Hargis & Associates	
* Annual Hydrologic Monitoring Plan.	1/31/89	Hargis & Associates	
* Water Sampling Manual, Preliminary Draft.	7/27/89	Hargis & Associates	
* Collection and Analysis of Soil Samples.	1/24/90	Versar, Inc.	
* GWRPT Leth RPTS ?	6/01/92	HLA	
* Preliminary Assessment/Site Inspection and Remedial Investigations/ Feasibility Studies, Final Sampling and Analysis Plan, AFP4.	8/31/90	U.S. Dept. of Energy	
* Preliminary Assessment/Site Inspection and Remedial Investigations/ Feasibility Studies, Final Work Plan, AFP4.	8/31/90	U.S. Dept. of Energy	
* Coordination of IRP Efforts for CAFB and AFP4 (RE: Letter 14 Mar 84).	4/24/84	AFSC	
* Draft Final No Further Action Decision Document, Landfill No. 2, Site LP02.	9/30/91	Chem-Nuclear Geotech, Inc.	
* Draft Final No Further Action Decision Document, Chrome Pit No. 1, Site DP11.	9/30/91	Chem-Nuclear Geotech, Inc.	
* Draft Final No Further Action Decision Document, Chrome Pit No. 2, Site DP10	9/30/91	Chem-Nuclear Geotech, Inc.	
* Draft Final No Further Action Decision Document, Fire Department Training Area No. 4, Site FT07.	9/30/91 9/30/92	Chem-Nuclear Geotech, Inc. Chem-Nuclear Geotech, Inc.	
* AFP4, Draft No Further Action Decision Document, West Compass Rose, IRP Site OT21.	9/30/92	Chem-Nuclear Geotech, Inc.	
* AFP4, Draft No Further Action Decision Document, Solvent Lines, IRP Site ST18.	9/30/92	Chem-Nuclear Geotech, Inc.	
* Investigation of Disposal/Cleanup Activities, Waste Disposal Project, West Parking Lot, AFP4, General Dynamics, Ft. Worth Division.	12/31/83	USEPA (Enforce. & Compliance)	
* TX State Board of Water Engineers, GW Resources of Ft. Worth & Area, TX.	9/30/42	W.O. George & N.A. Rose w/ USGS	
* Geology and Ground Water Resources of Tarrant County, Texas.	9/30/57	TX State Board of Water Engineers	
* Bulletin 6309, Reconnaissance Investigation of the Ground Water Resources of the Trinity River Basin, TX.	9/30/63	Texas Water Commission	
* Water-Level and Quality Data from Observation Wells in NE TX, Report 198.	3/28/76	Texas Water Development Board.	
* Variations in Specific Yield in the Outcrop of the Carrizo Sand in South TX as Estimated by Seismic Refraction.	4/30/79	Texas Dept. of Water Resources	
* Texas Surface Water Quality Standards.	4/30/81	Texas Dept. of Water Resources	
* Occurrence, Availiability, and Chemical Quality of Ground Water in the Cretaceous Aquifers of North-Central Texas, Report 269.	4/30/82	Texas Dept. of Water Resources	
* Occurrence, Availiability, and Chemical Quality of Ground Water in the Cretaceous Aquifers of North-Central Texas, Report 269.	7/31/82	Texas Dept. of Water Resources	
* Air Force Installation Restoration Program Management Guidance.	7/30/85	Dept. of the Air Force	

Source: ESE, 1994.

Table 2.0-3. Reports Considered Relevant to AFP4

Title	Date	Author	ESE Reference
* Phase I Investigation, Drilling and Construction of Upper Zone Test Holes and Monitor Wells.	1/31/83	Hargis & Montgomery	
* Installation Phase I Investigation of Subsurface Conditions at U.S. Air Force Plant 4, Ft. Worth, TX (Text).	2/03/83	Hargis & Montgomery	
* Installation Phase I Investigation of Subsurface Conditions at U.S. U.S. Air Force Plant 4, Ft. Worth, TX (Illustrations)	3/03/83	Hargis & Montgomery	
* Installation Phase I Investigation of Subsurface Conditions at U.S. U.S. Air Force Plant 4, Ft. Worth, TX (Appendices)	3/03/83	Hargis & Montgomery	
* Construction of Paluxy Monitor Well P-1, AFP4	3/18/83	Hargis & Montgomery	
* Specifications for Waste Disposal Project - West Parking Lot	6/30/83	General Dynamics	Yes
* Environmental, Energy, and Resource Conservation Review of AFP4	9/30/83	JRB Associates	
* Seismic Refraction Survey, Letter Report, Gen. Dynamics, Ft. Worth Div.	12/31/83	D'Appolonia Waste Management Ser.	
* Field notes for Die Yard & Chrome Pits Excav. & Anal. Lab Results.	1/31/84	General Dynamics	
* Installation/Restoration Program Records Search for AFP4	8/31/84	CH2M Hill	
* Conclusions and Recomdations for Completion of Phase II Investigation	10/25/84	Hargis & Associates	
* Phase II Investigation of Subsurface Conditions	9/30/85	Hargis & Associates	
* Phase II Investigation of Subsurface Conditions. Appendices A-E	9/30/85	Hargis & Associates	
* Phase II Investigation of Subsurface Conditions. Appendices F-G	9/30/85	Hargis & Associates	
* Phase II Investigation of Subsurface Conditions. Appendices H-I	9/30/85	Hargis & Associates	
* Phase II Investigation of Subsurface Conditions. Appendices J-M	9/30/85	Hargis & Associates	
* Draft Installation Restoration Program, Phase II, Confirmation/ Qualification, Stage 1, Final DRAFT report CAFB.	9/30/85	Radian Corporation	
* IRP Ph. II, Confirm./Qualif., Stage 1. App A Draft Final Report CAFB.	9/30/85	Radian Corporation	
* IRP Ph. II, Confirm./Qualif., Stage 1 App B-L, Draft Final Report CAFB.	9/30/85	Radian Corporation	
* Assessment of French Drain Pumpage.	12/06/85	Hargis & Associates	Yes
* Results of Soil & Groundwater Assessment for the Proposed Systems Development Laboratory and Anechoic Chamber Buildings.	12/16/85	Hargis & Associates	
* Proposed 1986 Hydrologic Monitoring Plan, AFP4	1/02/86	Hargis & Associates	
* Three-Site RAP Review action Items, Att. A Design Basis & Prelim. Calcs. Calcs. for Conceptual Design of Alt. 4, Onsite Contam. GW Trt & Discharge to AFP4 Process Water Makeup System.	f7/16/86	Intellus Corporation	Yes
* Draft RAP and Conceptual Documents for Fuel Sat. Areas No. 1 & 3.	7/31/86	Intellus Corporation	Yes
* Interim Report for Ten-Site Field Investigation, Prepared for AFP4.	11/30/86	Intellus Corporation	
* Construction Site Assessment Report for the Die Yard Zone.	1/30/87	Intellus Corporation	Yes
* Summary Report Window Area Investigation.	4/21/87	Hargis & Associates	
* Assessment Report for Landfill # 3, Prepared for AFP4.	8/31/87	Intellus Corporation	
* Proposed 1988 Hydrologic Monitoring Plan.	12/02/87	Hargis & Associates	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-1 Final Report 9/85-9/86	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-1 (cont), Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-1 (cont), Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-2 Final Report 9/85-9/86	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-2 (cont), Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. A-3 and A-4, Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. B-E, Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. F-K, Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, App. L, Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Ph. II, Confirm./Quantif., Stage 1, Report Text, Final Report 9/85-9/86.	12/31/87	Radian Corporation	
* IRP Phase II, Confirm./Quantif., Stage 2, CAFB QA Project Plan.	1/31/88	Radian Corporation	
* Evaluation of Condensor Water Pipeline and Interim Remedial Measures Fuel Sat. Area No. 3.	7/15/88	Hargis & Associates	Yes
* Engineering Report Remedial Action for Fuel Sat. Areas 1 and 3 and treating leachate of French Drain No. 1.	3/02/89	General Dynamics	Yes
* USTProgram Evaluation, Analysis of USTs at AFP4 App. F.	6/02/89	Hargis & Associates	
* Industrial Hygene Ass. of Organic Solvents at General Dynamics Plant, Ft. Worth, TX.	8/28/89	Clayton Env. Consult. For Hargis	
* Environmental Assessment, Advanced Matl. Development Laboratory Site.	10/20/89	Hargis & Associates	
* Preliminary Assessment/Site Inspection and Remedial Investigation/ Feasibility Studies, Final Quality Assurance Project Plan, AFP4.	8/31/90	U.S. Dept. of Energy	
* Preliminary Assessment/Site Inspection and Remedial Investigation/ Feasibility Studies, Final Health and Safety Plan, AFP4.	8/31/90	U.S. Department of Energy	

Source: ESE, 1994.

Table 2.0-3. Reports Considered Relevant to AFP4 (Continued, Page 3 of 3)

Title	Date	Author	ESE Reference
* Water Resources Data, Texas 86.	1/31/86	USGS	
* Water Resources Data, Texas 87.	1/31/87	USGS	
* Ground Water Conditions in Texas 1980-1985, Report 309.	10/31/88	Texas Water Development Board	
* Permanent Rule Change.	12/28/88	Texas Water Commission	
* Official TX Admin. Code, Title 31, Natural Resources and Conservation.	1/31/89	The State of Texas	
* Water Resources Data, Texas 89.	1/31/89	USGS	
* Official TX Admin. Code, Title 31, Natural Resources and Conservation, 1990-1991 Supplement, Amendments effective through April 1, 1990.	1/31/90	The State of Texas	
* Index to Texas Water Well Drillers Board			
* FEMA, Flood Insurance Study, Tarrant County, TX Unincorporated Areas.	8/04/87	Fed. Emergancy Management Agency	
* Geotech, Soil & Water Sample Analytical Data.	5/22/90	US Dept. of Energy	
* Certificate of Analysis.	5/29/90	ITT	
* Groundwater Remediation of Window Area -100% Design Package.	9/93	International Technology	Yes
* East Parking Lot, Installation of Groundwater System.	8/93	International Technology	Yes
* Draft Final Feasibitliy Study.	5/93	Chem Nuclear Geotech, Inc.	Yes
* Design Plan for Subsurface Barrier Wall at Landfill No. 3.	3/93	International Technology	Yes
* Groundwater Remediation of Window Area-50% Design Package.	3/93	International Technology	Yes
* Draft Contract Quality Control Plan Addendum, GW Remediation Window Area	10/92	International Technology	Yes
* Alternatives for East Plume Groundwater Remediation.	12/91	Tyndall AFB	Yes

Source: ESE, 1994.

Table 2.0-4. Reports Considered Relevant to CAFB

Title	Date	Author	ESE Reference
* Installation Restoration Program Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 2 Draft (9/87-9/88).	10/01/88	Radian Corporation	
* IRP Stage 1 Phase II Conformation/Quantification Final Report.	10/01/86	Radian Corporation	
* IRP Stage 2 Draft Remedial Investigation Report for the Flightline Area.	5/01/91	Radian Corporation	
* IRP Stage 2 Draft Feasibility Study for the Flightline Area.	5/01/91	Radian Corporation	
* IRP Stage 2 Draft CAFB Remedial Investigation Report for the Flightline Area (App. H).	5/01/91	Radian Corporation	
* IRP Stage 2 Draft CAFB Remedial Investigation for the East Area.	4/01/91	Radian Corporation	
* IRP Stage 2 Draft Feasiblity Study for the East Area.	5/01/91	Radian Corporation	Yes
* IRP Stage 2 Final Report CAFB App. H Remedial Investigation Report for the Flightline Area.	10/01/91	Radian Corporation	
* IRP Stage 2 CAFB Final Report Remedial Investigation Report for the East Area.	10/01/91	Radian Corporation	
* IRP Stage 2 CAFB Final Report Remedial Investigation for the Flightline Area.	10/01/91	Radian Corporation	
* IRP Phase II - Conformation/Quantification Stage 1. App. A.	10/01/86	Radian Corporation	
* IRP Phase II - Conformation/Quantification Stage 1. App. B-L.	10/01/86	Radian Corporation	
* IRP Stage 1 Draft Report Weapons Storage Area Site WSA-1.	10/01/88	Radian Corporation	
* Integrated IRP Phase II - Conformation/Quantification Stage 2 - Draft Work Plan.	11/01/87	Radian Corporation	
* Integrated IRP Phase II - Conformation/Quantification Stage 2 - Quality Assurance Project Plan.	1/01/88	Radian Corporation	
* IRP Phase II - Conformation/Quantification Stage 2 CAFB Health and Safety Plan.	10/01/87	Radian Corporation	
* Integrated IRP Phase II - Conformation/Quantification Stage 2 Work Plan.	1/01/88	Radian Corporation	
* IRP Phase II - Conformation/Quantification Stage 2. Work Plan Addendum.	3/01/90	Radian Corporation	
* IRP Stage 2 Site Characterization Report for the Flightline Area. Draft.	11/01/90	Radian Corporation	
* IRP Stage 2 CAFB Final Report. Feasibility Study for the East Area.	10/01/91	Radian Corporation	
* IRP Stage 2 CAFB Final Report. Feasibility Study for the Flightline Area.	10/01/91	Radian Corporation	Yes
* IRP RI/FS Site 13 Draft Decision Paper.	10/01/88	Radian Corporation	
* Environmental Compliance Assessment and Management Program. Draft Final Environmental Evaluation Report.	4/01/90	Science & Engineering Assoc.	
* An Inventory of the Woody Plants at CAFB.		David L. Morgan, Phd	
* Preliminary Report. Environmental Compliance Assessment and Management Program.	6/05/92	Argonne National Laboratories	
* Sample Results (From various CAFB sites and sources).	1/01/92	Compiled by Carswell	
* Sample results from Spills (From various CAFB sites and sources).	1/01/92	Compiled by Carswell	
* Final. RCRA Permit, Part B Permit Application DRMO - Carswell. I through VIII and App. A - K.	8/14/87	Hazardous Materials Tech. Center	
* Final. RCRA Permit, Part B Permit Application DRMO - Carswell. App. L-M.	8/14/87	Hazardous Materials Tech. Center	
* CAFB RCRA Permit, Part B # HW50289. Work Plan SWMU No.62 Landfill No. 6.	4/07/92	USACE Ft. Worth Dist.	
* CAFB RCRA Permit, Part B # HW50289. Investigation/Remediation Plans. SWMU# 16, 32, 35, 36, 61.	1/31/91	USACE Ft. Worth Dist.	Yes
* CAFB RCRA Permit, Part B # HW50289. Preliminary Remedial Action Plans. SWMUs 16, 22, 23, 24, 32, 35, 36, 61, 68.	9/09/91	USACE Ft. Worth Dist.	Yes
* CAFB RCRA Permit, Part B # HW50289. Work Plan. SWMU No. 62. Landfill No. 6	10/07/91	USACE Ft. Worth Dist.	
* CAFB RCRA Permit, Part B # HW50289. Work Plan. SWMU No. 64. French Underdrain System. SWMU No. 67. Bldg. 1340 - Oil Water Seperator.	10/07/91	USACE Ft. Worth Dist.	
* CAFB RCRA Permit, Part B # HW50289. Request for Dismissal. SWMU No. 18, Fire Department Training Area No.1 SWMU No. 63, Entomology Dry Well.	7/25/91	USACE Ft. Worth Dist.	
* CAFB RCRA Permit, Part B # HW50289. Draft Investigation/Remediation Report. Removal of Buried Drums and UST. SWMU No. 24, Waste Burial Area.	1/31/91	USACE Ft. Worth Dist.	Yes
* CAFB RCRA Permit, Part B # HW50289. RCRA Facility. Investigation/ Remediation Plan. Removal of Buried Drums and UST. SWMU No. 24, Waste Burial Area.	5/07/91	USACE Ft. Worth Dist.	
* CAFB RCRA Permit, Part B # HW50289. RFI Work Plans. East area remedial investigation. Weapons Storage Area. Other (Non-IRP) Site Investigations.	5/07/91	Radian Corporation	
* CAFB RCRA Permit, Part B # HW50289. RFI Work Plans. Flightline Area Site Characterization. Flightline Area Feasibility Study.	5/07/91	Radian Corporation	

Source: ESE, 1994

Table 2.0-4. Reports Considered Relevant to CAFB (Continued, Page 2 of 2) 180 35

Title	Date	Author	ESE Reference
* IRP Final Report. Weapons Storage Area, Site WSA-1.	5/01/89	Radian Corporation	
* IRP RI/FS Study. Draft Decision Paper.	10/05/89	Radian Corporation	
* DPM and IRP Guidance. (DPM Scoring for IRP Sites at CAFB).			
* Comprehensive Plan. CAFB Final Submittal.	5/01/86	Pierce Goodwin Alexander	
* Air Combat Command. Environmental Symposium. Administrative Record. Resource Materials 1-5. Seminal/Class Handout for Administrative Record.	5/05/93	Labat-Anderson, Inc.	
* Programming Documents. IRP (Planning, Programming, Budget Plans by Site.)	7/08/92		
* Air Force Disposal Agency. Basic Closure Account. Environmental Programming and Funds Management Guidance.	1/01/93		
* IRP Management Book. (IRP Guidance Document, DERA Eligibility). Programming Guidance, IRP Cost Est., IRP Project Managers Guide. (Draft)	7/01/88		
* Revised Hazard Ranking Sytem. (Cross Reference to Fed. Reg. Vol. 55).	1/14/92		
* Test Plan and Technical Protocol for a Field Treatability Test for Bioventing.	5/01/92	Env. Service Off. AF Center	
* USAF IRP Project Team Training Guide. Job Requirements, Recommended Curricula, and availiable Resources. (Draft)	2/01/93		
* USAF IRP NFRAP Guide. Making, Documenting, and Evaluating No Further Response Action Planned Decisions. Final Draft.	2/01/93		
* Remedial Technology Design Performance and Cost Study. (Assembly of design cost, and performance info. for 8 frequently applied remedial technologies - air stripping, bioremediation, etc).	7/01/92	Env. Service Off. AF Center	
* BioRemediation Fundamentals and Effective Applications Proceedings. 3rd annual Symposium. Gulf Coast Hazardous Substance Research Center.	2/22/92		
* IRP Remedial Project Managers Guide. Air Combat Command. Environmental Quality 1993.	11/01/92		
* USAF Environmental Restoration. Contracting Strategies Analysis. (Compendium of contracting strategies).	1/01/92		
* Subsurface Contamination Assessment. White House Communications Building 1337.	4/18/90	Maxim Engineers, Inc.	
* IRP Records Search for CAFB.	2/01/94	CH2M Hill, Gainesville, FL	
* RCRA Facility Assessment. PR VSI Report. CAFB EPA I.D. TXD571924042.	3/01/89	A.T. Kerney, Inc.	
* Well Completion 1990 (Compilation of Monitoring Well/Boring Logs).			
* IRP Site 12 FinalReport. 90% Plans & Specifications for the Remediation of the Fire Department Training Area 2, IRP Site 12.	6/01/91	Radian Corporation	Yes
* IRP Site 13 Draft Report-May 91. 90% Plans & Specifications for the Remediation of the Flightline Drainage Ditch. IRP Site 13.	5/01/91	Radian Corporation	
* POL Tank Farm. 9 Pt. Letter (Info. sent to TWC regarding POL tank farm).			
* Decision Documents and No Further Action. (Compilation of IRP RI/FS Decision Papers) Site13, Flightline DitchDP, WSA, Base Service Sta., Site 12, Site 11, Ent., etc.		Radian Corporation	Yes
* RFI Work Plan.	3/07/91	CAFB	
* Phase II Report. Groundwater Sampling & Subsurface Soil Delineation.	12/01/93	Geo-Marine, Inc. Plano, TX	
* POTW Discharge Permit.	10/93	International Technology Corp.	Yes
* Management Action Plan.	3/93	U.S. Army Corps of Engineers	Yes
* 90% Design Cost Estimates - Site SD10.	6/91	Radian Corporation	Yes
* 90% Plans and Specifications - Site SD10.	6/91	Radian Corporation	Yes
* 90% Design Cost Estimate - Site 12.	6/91	Radian Corporation	Yes
* Summary of Permit Sites.	5/91	U.S. Army Corps of Engineers	Yes

Source: ESE, 1994

3.0 SUMMARY OF REMEDIATION PROJECTS

The literature review revealed a total of 16 remediation projects either completed, in the remedial action phase, or in advanced phases of planning or design. Ten of these projects are located at AFP4 and are listed in the following:

1. Landfill No. 1,
2. Fire Department Training Area No. 6,
3. Chrome Pit No. 3,
4. Die Yard Chemical Pits,
5. Fuel Saturation Area No. 1,
6. Fuel Saturation Area No. 3,
7. Landfill No. 3,
8. East Parking Lot Plume (Window Area), and
9. Assembly Building/Parts Plant 181, and
10. USTs.

The remaining six projects are located at CAFB:

1. Landfills No. 4 and 5,
2. Waste Burial Area,
3. POL Tank Farm,
4. Flightline Drainage Ditch,
5. Fire Training Area No. 2, and
6. USTs.

The location of each remediation project is depicted in Figure 3.0-1; project descriptions are presented in the following sections.

The following sections are formatted to briefly describe the remediation site and project, summarize all reports deemed pertinent to the Task 2 objectives, and address the requirements for the Task 2 SOW.

NOTE:
THE LOCATIONS OF USTs AT CARSWELL AIR FORCE BASE ARE NOT SHOWN ON THIS FIGURE.

180 37

N

0 800 1600
SCALE FEET

FDTA 6
UST 25A
FSA3
UST 30
CITY BOUNDARY
FORT WORTH
FORTH WORTH CITY BOUNDARY
WHITE SETTLEMENT CITY BOUNDARY
FRENCH DRAINS
LF03
FSA1
LF01
USTs 19 & 20
USTs 24A & 24B
EAST PARKING LOT
DP12
DP13
BLDG. 181
SD10
ST14
LF05
WP07
FTA02
LF04
WESTWORTH CITY BOUNDARY
WHITE SETTLEMENT CITY BOUNDARY

AIR FORCE PLANT NO. 4 REMEDIATION PROJECTS

IRP SITE NO.	SITE TITLE
3	LANDFILL NO. 3 (LF03)
1	LANDFILL NO. 1 (LF01)
13	DIE YARD CHEMICAL PITS (DP13)
22	EAST PARKING LOT/FLIGHTLINE AREA (WINDOW AREA)
12	CHROME PIT NO. 3 (DP12)
–	ASSEMBLY BUILDING/PARTS PLANT–181 (BUILDING 181)
14	FUEL SATURATION AREA NO. 1 (FSA1)
17	FUEL SATURATION AREA NO. 3 (FSA3)
9	FIRE DEPARTMENT TRAINING AREA NO. 6 (FDTA 6)
–	UNDERGROUND STORAGE TANK SITES (USTs) 19, 20, 24A, 24B, 25A & 30

CARSWELL AIR FORCE BASE REMEDIATION PROJECTS

SWMU NO.	IRP SITE NO.	SITE TITLE
19, 20, 21	12	FIRE TRAINING AREA NO. 2 (FTA02)
22	4	LANDFILL 04 (LF04)
23	5	LANDFILL 05 (LF05)
24	10	WASTE BURIAL AREA (WP07)
68	17	POL TANK FARM (ST14)
53	13	FLIGHTLINE DRAINAGE DITCH (SD10)

Figure 3.0–1
REMEDIATION PROJECTS
AIR FORCE PLANT NO. 4 & CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

SOURCE: ESE

Environmental Science & Engineering, Inc.
A CILCORP Company

3.1 LF01

LF01 (Figure 3.1-1) was used for disposal of much of the facility's wastes from 1942 until about 1966. Materials disposed of at LF01 include drums of unspecified liquid wastes, solvents, thinners, paint wastes, burned oils and fuels, rubble, plaster, and lumber. Suspected waste includes magnesium waste, chromate sludges, and cyanide. The primary site in this area is referred to as the waste oil pits.

In September 1982, the Fort Worth Water Department was anonymously notified of odors coming from a stormwater outfall adjacent to the west property boundary of AFP4. Groundwater was apparently seeping into the joints of a buried 36-inch stormwater drainage pipe that connected two stormwater inlets and ultimately discharged into Meandering Road Creek. This buried pipe, which has been referred to as the Stormwater No. 5 (St. 5) outfall, runs parallel to the western boundary of the parking lot, between the lot and Meandering Road (CH2M Hill, 1984). Analyses of water samples subsequently collected from the outfall identified several contaminants, the most prevalent of which was TCE. GD personnel concluded that the immediate suspected contamination source was infiltration from beneath the West Parking Lot.

To prevent further infiltration into the St. 5 outfall system, GD installed a french drain system (French Drain No. 1) in November 1982. The system consists of a 90-foot (ft) length of perforated 4-inch drain pipe placed on bedrock east of the St. 5 outfall. During excavation, two 6-inch perforated pipes were also uncovered. These pipes were apparently installed in 1967 before the parking lot was graded for paving. The 6-inch pipes were also connected to the system.

In 1983, additional remedial actions were conducted near the site of French Drain No. 1, within the area of LF01. Because the main source of residual contamination was suspected to be the former waste oil pits, an area beneath the West Parking Lot was excavated to bedrock. Six 24-inch drainlines (French

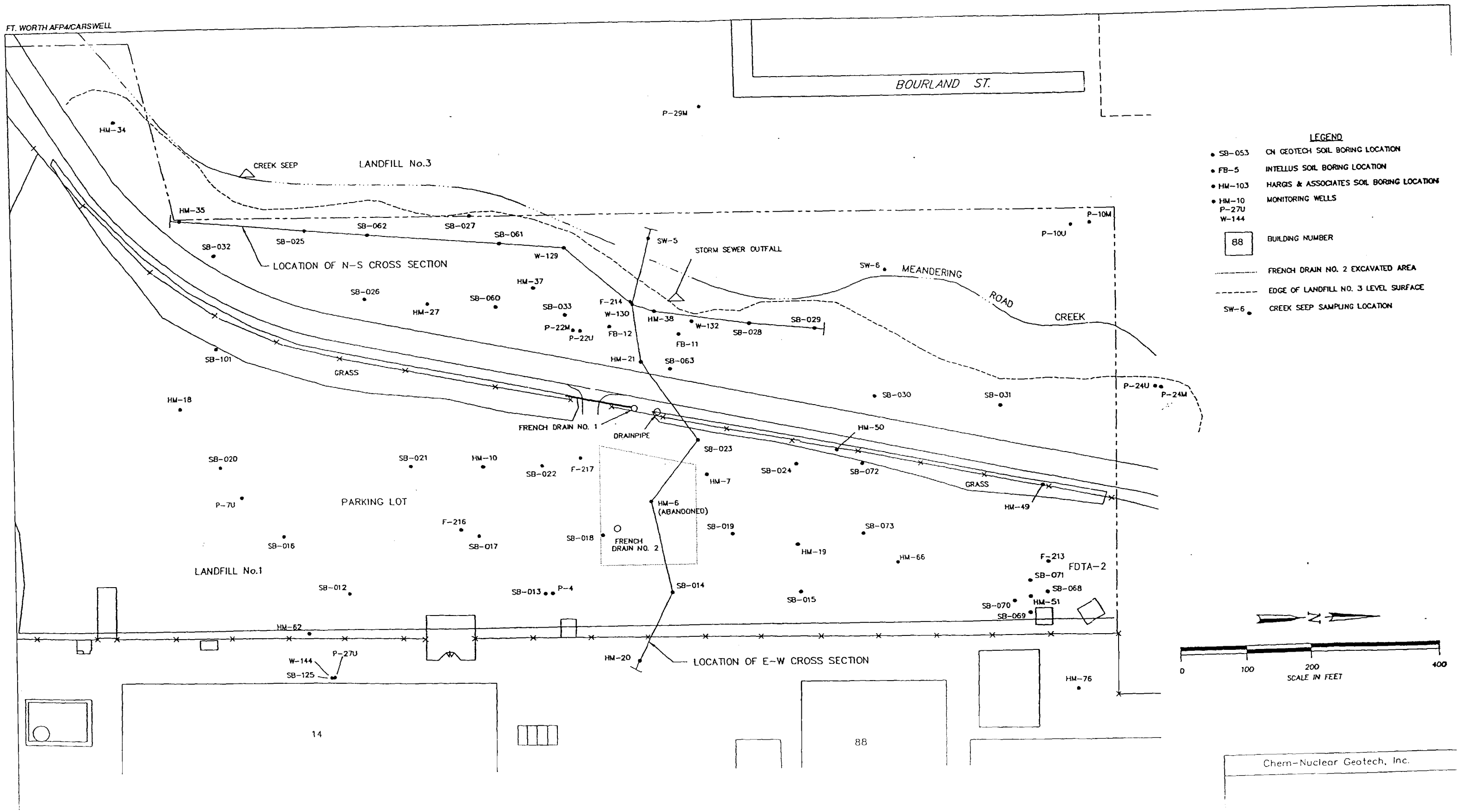

Figure 3.1-1 BOREHOLE SOIL SAMPLE LOCATIONS AT LANDFILLS NO. 1 AND NO. 3

Drain No. 2) were placed in the bottom of this pit and connected to a collector box (CH2M Hill, 1984). Prior to December 1984, French Drain No. 1 was evacuated daily using a vacuum truck to reduce the amount of groundwater infiltration into the St. 5 outfall. Evacuated water was initially deep well injected, then incinerated.

A submersible electric pump in French Drain No. 2 was activated on December 20, 1984, and diversion of groundwater to the cooling tower and sanitary sewer was begun. In May 1990, the disposal options for groundwater collected in French Drains No. 1 and No. 2 were no longer available. The drains remained inactive until October 1992, at which time recovered groundwater treatment was resumed at FSA-1. Water from the underdrain systems continues to be treated at FSA-1.

3.1.1 SUMMARY OF REPORTS FOR LF01

The following four reports were considered to contain information pertinent to the Task 2 objectives:

1. Final Feasibility Study (RUST Geotech, 1993);
2. Specifications for Waste Disposal--West Parking Lot (GD, 1983);
3. Assessment of French Drain Pumpage (Hargis & Associates, Inc., 1985); and
4. Engineering Report, Remedial Action for Fuel Saturation Areas No. 1 and 3 and Treating Leachate from French Drain No. 1 (HDR, 1988).

Detailed summaries of each of these reports, as they pertain to LF01, are presented in Appendix A. The following is a brief description of the reports.

Specifications for Waste Disposal--West Parking Lot (GD, 1983)

This report is a bid document that details the formal bid process pertaining to the excavation and offsite disposal of the contaminated soil from the West

Parking Lot and specifically addresses job description, quality assurance, job conditions, and earthwork.

The report also specifies the following qualifications for the contractors: the contractor shall be a specialist in the field of contaminated waste handling and disposal and shall have the personnel, skill, and organization to provide efficient and effective completion of the work. Also, the contractor's responsibility shall include scheduling and coordinating all work with a minimum of delay. The specified work to be done consists of the furnishing of all labor, supervision, materials (unless specified as owner-furnished), equipment, tools, appliances, and services necessary for the work.

Assessment of French Drain Pumpage (Hargis & Associates, Inc., 1985)

In this report, changes in the groundwater chemical quality in response to groundwater pumpage from the french drains was assessed in the vicinity of West Parking Lot. Changes in groundwater chemical quality were detected as a result of groundwater pumpage from the french drains. In general, the concentrations of TCE and 1,2-dichloroethene (12DCE) have decreased due to groundwater pumpage. However, no clear relationship was established between groundwater pumpage and the groundwater chemical quality.

Engineering Report, Remedial Action for Fuel Saturation Areas No. 1 and 3 and Treating Leachate from French Drain No. 1 (HDR, 1988)

An engineering report was prepared and interim remedial actions were developed for FSA-1, FSA-3, and French Drain No. 1. The remedial actions were divided into recovery and treatment systems, and five alternatives were evaluated for technical feasibility and cost effectiveness for each system. Because the only portion of the report pertinent to LF01 is treatment of water from French Drain No. 1, only those alternatives considered for water treatment will be discussed here. A more complete report description can be found in Appendix A.

The alternatives evaluated for the treatment system include the following:

1. Alternative 1A--centralized treatment system using air stripping followed by liquid and vapor-phase granular activated carbon (GAC);
2. Alternative 1B--centralized treatment system using liquid-phase carbon;
3. Alternative 2--trucking versus pumping of groundwater to the centralized treatment system;
4. Alternative 3--localized treatment systems at FSA-1 (for groundwater from FSA-1 and French Drain No. 1) and FSA-3; and
5. Alternative 4--option 1B, including onsite regeneration of activated carbon.

Alternative 1B was selected for the treatment system alternative evaluation. Alternative 1B consisted of the following treatment components:

1. Gravity separators to separate the recovered free-product from groundwater at FSA-1, FSA-3, and French Drain No. 1;
2. Equalization tanks to store the recovered free-product and the separated groundwater; and
3. Two 10,000-pound (lb) GAC units to treat the separated groundwater.

The treatment system was designed based on a 20 gallons per minute (gpm) influent rate at a cost of $1,360,000 for a total of 3 years. The process and instrumentation diagram for the treatment system is presented in Figure 3.1-2.

Final Feasibility Study (RUST Geotech, 1993)

An FS was prepared in 1993 for sites at AFP4. In the FS, remedial response objectives were identified for each contaminated site (by media). Technologies were identified and screened, assembled into remediation alternatives, and evaluated against seven criteria.

FT. WORTH AFP4/CARSWELL

CP-300
Close
Open
HS-3 301
OR
LAH 301
LAL 301
Close
Open
HS-3 302
Close LAH
I/II Signal to Process Control Lab and EMCS

Float Activator Built in
P-1001 French Drain No. 1
P-1007 CGTF Sump Pump
Air Compressor Control Panel (Built-in)
HS-2
PS
Receiver
PI
S
Typical Well (F-202,F-210,HM-78,FSA3-11, F-201,F-222,F-223)
Fuel/Water Separator
LE
SG
PD
Flow Equalization Tank T-301
FRL

Air Compressor Control Panel (Built-in)
HS-2
PS
Receiver 115 Gallon
FE
Fuel/Water Separator (Stl)
SG
Recovered Product Tank (Stl) Cap=4100 Gallons

HS-2
Run
Chemical Metering Pump Control Panel (Built-in)

PI
FSA-1
F205 Withdrawal Well
F206 Withdrawal Well

1001
LE
T-1001 Flow Equalization Tank (FRP) Cap=750 Gal
Horizontal End Suction Pumps (Typ) 25 GPM ea.
P-1002
P-1003
10,000 Lbs of Carbon
10,000 Lbs of Carbon
Granular Activated Carbon Filters
1002
LE
T-1002 Flow Equalization Tank (FRP) Cap=750 Gal
Horizontal End Suction Pumps (Typ) 25 GPM ea.
P-1004
P-1005
Discharge To Industrial Waste System

CP-1000
Close 1006
Open 1006
HS-3 1006
Close LAH
OR
HS-2 1007
HS-3 1001
Run 1001
Stop 1001
Close LAH
OR
LAL 1001
LAH 1001
Stop LAH
OR
HS-3 1002
Run 1002
Stop 1002
OR
HS-3 1003
Run 1003
Stop 1003
Stop LAH
LAL 1002
LAH 1002
HS-3 1004
Run 1004
Stop 1004
HS-3 1005
Run 1005
Stop 1005
LAH Signal to Process Control Lab and EMCS
LAH Signal to Process Control Lab and EMCS

Note: Control system for well pumps to be provided as part of pump (package supplied by manufacturer (typ)).

Figure 3.1-2 PROCESS AND INSTRUMENTATION DIAGRAM

The remedial response objective for contaminated groundwater is to prevent human exposure to TCE and dichloroethene (DCE) in concentrations exceeding preliminary remedial goals (PRGs). Soil remediation is not recommended at this site.

Applicable remedial technologies for groundwater were identified and screened based on technical implementability and effectiveness. Effectiveness was based on (1) the potential effectiveness of process options in handling the estimated volumes of media and satisfying the identified remedial action objectives, and (2) the proven reliability of the process with respect to the contaminants at AFP4.

The following four alternatives were developed for groundwater:

1. No action,
2. Physical treatment (air stripping),
3. Chemical treatment [ultraviolet (UV) light and oxidation], and
4. Biological treatment (aboveground bioreactors).

The assembled alternatives were then evaluated in detail against the following nine evaluation criteria:

- Overall protection of human health and the environment;
- Compliance with applicable or relevant and appropriate requirements (ARARs);
- Long-term effectiveness;
- Reduction of toxicity, mobility, and volume (TMV);
- Implementability;
- Short-term effectiveness;
- Cost;
- State acceptance; and
- Community acceptance.

Final recommendations for a preferred alternative were not presented in the report.

3.1.2 REMEDIATION PROJECT OBJECTIVES

The objective of the interim remedial actions was to excavate and remove approximately 10,700 yd^3 of Class I Hazardous Industrial Waste from the West Parking Lot of AFP4. The objective of the installation of French Drain Nos. 1 and 2 was to collect leachate from the West Parking Lot area. The long-term remedial action objectives for LF01 are to remediate contaminated soils and groundwater to levels below PRGs.

3.1.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Approximately 11,000 yd^3 of contaminated soils were removed from the West Parking Lot and transported to an offsite disposal facility in 1983 as part of an interim remedial action. No information pertaining to actual remedial activities conducted was identified in the records reviewed.

Two french drains were installed in the excavation created as part of the waste disposal project. French Drain Nos. 1 and 2 were placed to a depth of approximately 5 ft and 30 ft, respectively. Water is being successfully collected from these drains. The water collected by French Drain Nos. 1 and 2 is being treated at the groundwater treatment system for FSA-1. The system consists of an oil/water separator, a low-profile air stripper, and two 10,000-lb carbon adsorption units.

Flow records maintained since 1988 estimate approximately 376,000 gallons (gal) of water have been collected from French Drain No. 1. An estimated 31,700,000 gal of water have been recovered from French Drain No. 2 since 1984 (Lockheed, 1994).

The literature review indicated that no remedial efforts beyond those summarized from the FS in Section 3.1.1 have been conducted.

3.1.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data were developed as a result of the excavation and removal of contaminated soils to an offsite disposal facility. Remedial alternatives were identified and evaluated as part of the FS.

The changes in groundwater quality due to pumpage from the french drains at the West Parking Lot were assessed.

3.1.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

No information pertaining to recommendations for additional studies or remediation was identified during the records review.

3.1.6 PROJECTS RESULTING FROM THE PROJECT

Based on review of the file material, no additional projects resulted from this project.

3.1.7 PROJECT STATUS

The interim remedial action was completed in 1983. No further soil remediation has been performed at the site. Alternatives described in the 1993 FS for LF01 have not been implemented to date.

The french drains are currently in operation. The water collected by French Drain Nos. 1 and 2 is being treated at the groundwater treatment system for FSA-1. The design capacity for FSA-1, which also treats groundwater from two groundwater extraction wells at FSA-1, is 70 gpm. Lockheed is planning to install flow measurement devices to accurately monitor flow from the french drains.

3.1.8 SCHEDULE

The MAP projects that a Proposed Plan for this site will be completed in November 1993 and a Record of Decision (ROD) will be completed in June 1994. No information updating the schedule for the 1992 MAP was present in the project files.

3.1.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.1.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None were observed.

3.2 FDTA 6

FDTA 6 was the primary fire department training area at AFP4 from the late 1950s to 1980 (CH2M Hill, 1984). It was located on the northwestern side of AFP4 adjacent to Meandering Road and Lake Worth (Figure 3.2-1). FDTA 6 consisted of a 50-ft-diameter gravel-lined ring that was approximately 2 ft deep and surrounded by an earthen berm (Hargis & Montgomery, 1983). The training area was used from the late 1950s to 1980 for periodic training exercises that used approximately 250 gal of waste fuels and oils per exercise. Before 1970, training exercises were conducted twice a year; after 1970, exercises were conducted at monthly intervals (Radian, 1987). The IRP Phase I investigations (CH2M Hill, 1984) indicated that unknown quantities of fuels and oils were likely deposited in FDTA 6 between training exercises.

Interim remedial action was performed at FDTA 6 in 1982 and 1983 when oil- and fuel-contaminated soils were removed and hauled to an approved hazardous waste landfill. Although most of the contamination may have been removed, there were insufficient data to verify that remaining contaminants did not pose a potential risk to the environment or human health.

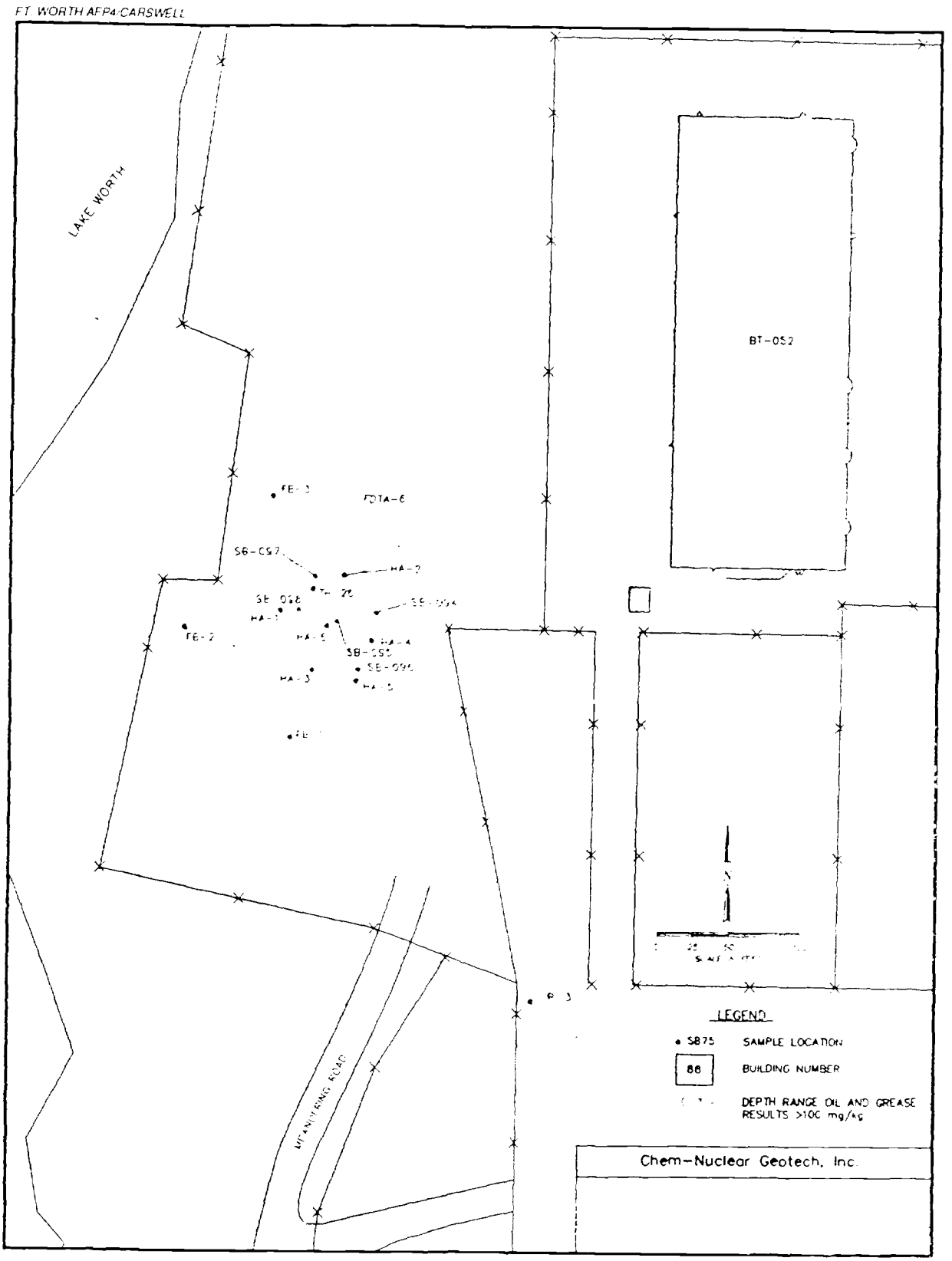

Figure 3.2-1 **LOCATION PLAN FOR FDTA-6**

Analytical results of previous investigations indicate that the soils around FDTA 6 are contaminated with VOCs, semivolatile organic compounds (SVOCs), fuel hydrocarbons, and oil and grease.

3.2.1 SUMMARY OF REPORTS FOR FDTA 6

Two reports were considered to contain information pertinent to the Task 2 objectives:

1. MAP for AFP4, 1992; and
2. Final Feasibility Study (RUST Geotech, 1993).

Detailed summaries of each of these reports are presented in Appendix A. The following is a brief description of the reports, as they pertain to FDTA 6.

MAP 1992

This report notes that an interim removal of an unknown volume of soils was completed in 1982 and 1983. This action removed only a portion of the potential source. No reports were identified which detail the remedial effort.

Final Feasibility Study (RUST Geotech, 1993)

This report states that site remediation would require removing an estimated 170 yd^3 of contaminated material. The volume of soils to be remediated is based on Figure 3.2-2.

3.2.2 REMEDIATION PROJECT OBJECTIVES

The objective of the interim removal action conducted in 1982 and 1983 was to eliminate the contaminant source. The objective of the pending remediation to be performed in the area is to remove an additional 170 yd^3 of contaminated soils.

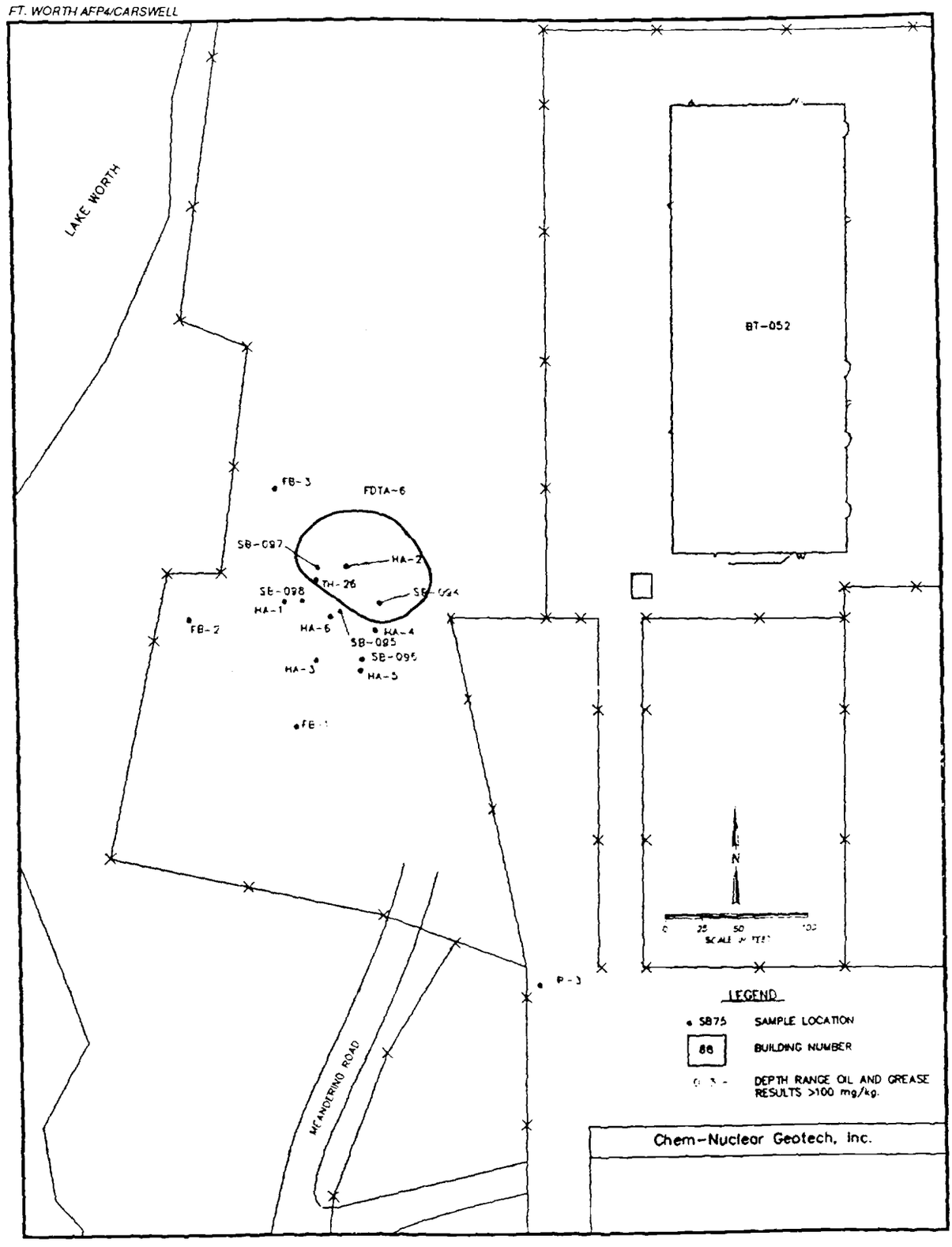

Figure 3.2-2 EXTENT OF TOLUENE AND OIL AND GREASE DETECTED AT FDTA-6

3.2.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

An unspecified volume of soils was removed in 1982 and 1983. The removal action did not remove all contaminated soils at the area.

3.2.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

Investigative activities following completion of the interim remedial actions indicated that removing an additional 170 yd^3 of contaminated soils is necessary.

3.2.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

An additional 170 yd^3 of contaminated soils still need to be remediated at FDTA 6.

3.2.6 PROJECTS RESULTING FROM THE PROJECT

A project involving removal of approximately 170 yd^3 of soils is specified.

3.2.7 PROJECT STATUS

The interim remedial action is complete. No information pertaining to the status of the future remedial action at the site was available in the file material.

3.2.8 SCHEDULE

The interim remedial actions were completed in 1983. The schedule of further remediation at FDTA 6 is unknown. The MAP projects that a ROD for the site will be completed in June 1994; no schedule for the Proposed Plan is identified in the MAP. Information updating the schedule for the 1992 MAP was not present in the project files.

3.2.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.2.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

The May 1993 FS for AFP4 specifies that remediation of an estimated 170 yd^3 of contaminated soils from FDTA 6 is required. However, the FS did not recommend remedial actions for soils at this site.

3.3 DP12

DP12, located on the Radar Range west of Facilities Building No. 12 (Figure 3.3-1), was used for the disposal of chromate, barium-chromate sludge, dilute metal solutions, and drums of unidentified liquids from 1957 to 1973. The pit measured 66 by 165 by 15 ft deep (Hargis & Associates, Inc., 1985). From December 1983 through January 1984, approximately 8,900 yd^3 of contaminated soils were excavated and removed from the chrome pit as an interim remedial action. The approximate outline of the excavation is illustrated in Figure 3.3-1. Analytical results of samples collected during the excavation indicated that the greatest concentrations of contaminants were removed (CH2M Hill, 1984). However, some contaminants may remain in the soils and groundwater adjacent to the excavated portion of the pit. Additional soil sampling below the excavation is necessary to determine if contamination is still present.

3.3.1 SUMMARY OF REPORTS FOR DP12

Two reports were considered to contain information pertinent to the Task 2 objectives:

1. MAP for AFP4 1992; and
2. Final Feasibility Study (RUST Geotech, 1993).

Detailed summaries of each of these reports are presented in Appendix A. The following is a brief description of the reports, as they pertain to DP12:

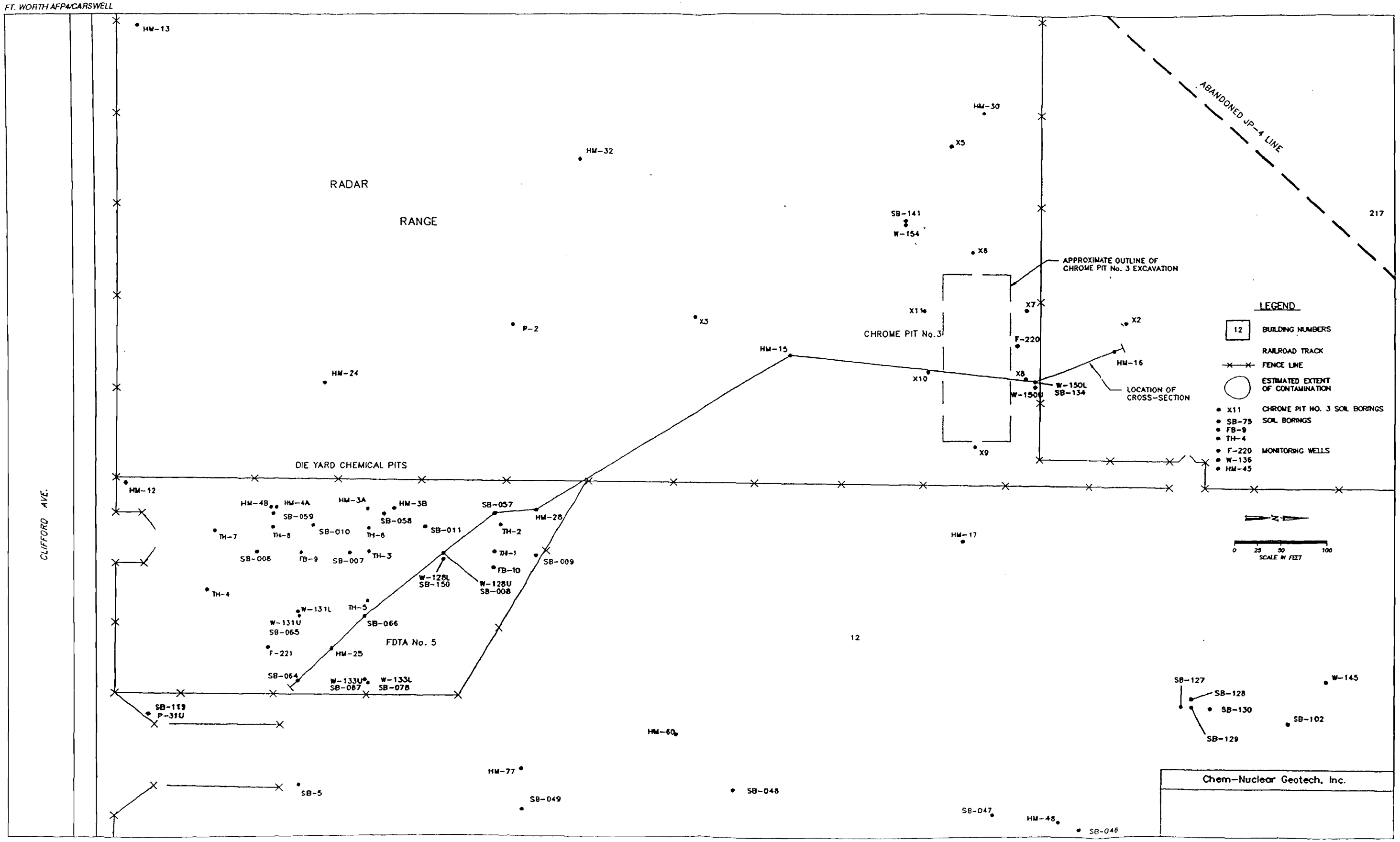

Figure 3.3-1 **SAMPLE LOCATIONS AT CHROME PIT NO. 3**

MAP 1992

The MAP specifies that an interim soils removal action involving 8,900 yd^3 of contaminated soil was performed in 1983 and 1984 to eliminate a contaminant source. Additional sampling below the excavation is necessary to verify if additional contamination is present.

Final Feasibility Study (RUST Geotech, 1993)

The 1993 FS summarizes contamination at DP12 and recommends additional sampling below the excavation to determine if contamination is present. DP12 was not considered a site which warranted remedial action. No constituents present at DP13 exceeded PRG levels defined in the risk assessment (RA).

3.3.2 REMEDIATION PROJECT OBJECTIVES

The objective of the interim soils removal action in 1983 and 1984 was to eliminate a contamination source.

3.3.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

The interim removal action performed in 1983 and 1984 removed contaminated soils to levels below those which would warrant remedial action.

3.3.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data were developed as a result of the interim remedial action.

3.3.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

The 1993 FS recommends additional soil sampling be performed below the 1983 and 1984 excavation to determine if contamination is present.

3.3.6 PROJECTS RESULTING FROM THE PROJECT

No additional projects have resulted from the interim remedial action conducted in 1983 and 1984 or the 1993 FS.

3.3.7 PROJECT STATUS

The 1983 and 1984 interim remedial action has been completed. The status of further sampling at DP12 was not documented in the project files.

3.3.8 SCHEDULE

The 1983 and 1984 interim remedial action has been completed. The schedule of further sampling at DP12 is unknown. The MAP projects that a Proposed Plan for this site will be completed in November 1993 and a ROD will be completed in June 1994. No information which updated the schedule for the 1992 MAP was present in the project files. Because DP12 was not a site which was considered to warrant remedial action, decision documents for this site may not be necessary.

3.3.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.3.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None observed.

3.4 DP13 (THE DIE YARD ZONE)

DP13 is the concrete paved area located south of Warehouse No. 1 and north of Clifford Avenue. The area has most recently been used for storage of casting molds. Two specific contamination sources, DP13 and the Fire Department Training Area No. 5 (FDTA 5), are located in the Die Yard Zone. Figure 3.4-1 shows the Die Yard Zone Location Plan. Tables 3.4-1 and 3.4-2 present the contamination in soils and groundwater, respectively, at the Die Yard Zone. Soil and groundwater alternatives were defined and evaluated to relate the respective solutions for soil and groundwater management.

FT. WORTH AFP4/CARSWELL

CLIFFORD AVE.

ABANDONED JP-4 LINE

RADAR

RANGE

CHROME PIT No.3

APPROXIMATE OUTLINE OF CHROME PIT No. 3 EXCAVATION

DIE YARD CHEMICAL PITS

METHYLENE CHLORIDE

TCE
TOLUENE
1,2-DICHLOROETHENE
METHYLENE CHLORIDE

FDTA No. 5

LOCATION OF CROSS-SECTION

HM-13 HM-32 HM-30 X5 SB-141 W-154 X6 X7 X11 X3 P-2 X2 F-220 HM-15 HM-16 X10 X8 W-150L SB-134 W-150L X9 217

HM-12 HM-4A HM-4B SB-059 TH-8 TH-7 METHYLENE CHLORIDE 10'-14' SB-010 HM-3A 15'-17' HM-3B 15'-20' SB-057 TH-2 HM-28 SB-011 20'-23' TH-6 SB-058 TH-1 SB-006 FB-9 SB-007 TH-3 W-128U SB-008 SB-009 W-128L SB-150 FB-10 0'-15' TH-4 W-131L W-131U SB-065 TH-5 SB-066 F-221 HM-25 SB-064 W-133U SB-067 W-133L SB-078 SB-119 P-31U SB-5 HM-77 SB-049 SB-048 SB-047 HM-48 SB-046

HM-17 12 HM-60 SB-127 SB-128 SB-130 SB-129 W-145 SB-102

LEGEND

- 12 BUILDING NUMBERS
- RAILROAD TRACK
- FENCE LINE
- ESTIMATED EXTENT OF CONTAMINATION
- X11 CHROME PIT 3 SOIL BORINGS
- SB-75 SOIL BORINGS
- FB-9
- TH-4
- F-220 MONITORING WELLS
- W-136
- HM-45

0 25 50 100
SCALE IN FEET

Chem-Nuclear Geotech, Inc.

Figure 3.4-1 EXTENT OF VOCS DETECTED AT THE DYCP

Table 3.4-1. Summary Chemical Analyses of Soil Samples for Metals

Metal Constituents (ppb)	DIE YARD PITS Sample Number: FB-9 7-7.5'	FB-9 13-13.5'	DIE YARD PITS Sample Number: FB-10 8-8.5'	FB-10 11-11.5'	FDTA 5 Sample Number: F-221 3-3.5'	F-221 7-7.5'	BACKGROUND LEVELS (ppm)
Alumium	8000	11000	13000	15000	13000	14000	Common
Antimony	ND	ND	ND	ND	ND	ND	0.25-0.6 ppm
Arsenic	ND	ND	ND	ND	ND	ND	0.1-69 ppm
Barium	48	49	39	47	58	46	20-3,000 ppm
Beryllium	ND	ND	ND	ND	ND	ND	.1-15 ppm
Cadmium	ND	ND	ND	ND	ND	ND	0.0-3.0 ppm
Calcium	260000	140000	240000	200000	180000	190000	Common
Chromium	8.0	8.5	11	12	10	9.9	5-1,000 ppm
Cobalt	ND	ND	ND	ND	ND	ND	1-40 ppm
Copper	ND	ND	ND	ND	ND	ND	1-1,000 ppm
Iron	9700	9500	11000	13000	10000	10000	.5-5%
Lead	ND	ND	ND	ND	ND	ND	2-200 ppm
Magnesium	2500	2400	3500	3300	2800	2600	Common
Manganese	290	240	210	290	210	190	7-3,000 ppm
Molybdenum	14	22	25	29	23	28	0.8-30 ppm
Nickel	7.4	8.0	9.7	11	8.6	9.0	5-200 ppm
Potassium	880	1300	1800	1800	1400	1500	Common
Selenium	ND	ND	ND	ND	ND	ND	0.0005-4 ppm
Silica	180	2600	370	520	470	370	Common
Silver	ND	ND	ND	ND	ND	ND	0.9-0.09 ppm
Sodium	290	210	290	330	510	260	Common
Strontium	160	77	170	130	96	88	1-3,500 ppm
Thallium	ND	ND	ND	ND	ND	ND	2-200 ppm
Vanadium	22	16	22	23	22	21	5-460 ppm
Zinc	15	18	21	29	20	21	less than 5-300 ppm

ND = Not Detected

Sources: Intellus 1987; ESE

Table 3.4-2. Variation of Volatile Organic Compound Concentrations in Groundwater Over Time at Monitor Wells HM-24, HM-25, and HM-28

Figure No.	Compound	Monitoring Well No.
A.1	Chloroform	HM-24
A.2	Dichloropropane	HM-24
A.3	Methylene Chloride	HM-24
A.4	Trichloroethylene	HM-24
A.5	Benzene	HM-25
A.6	Chlorobenzene	HM-25
A.7	Ethyl-Benzene	HM-25
A.8	Toulene	HM-25
A.9	1,2-Trans-Dichloroethylene	HM-25
A.10	Chloroform	HM-28
A.11	1,2-Trans-Dichloroethylene	HM-28
A.12	Trichloroethylene	HM-28

Sources: Intellus, 1987; ESE.

3.4.1 SUMMARY OF REPORTS FOR DP13

Three reports were considered to contain information pertinent to the Task 2 objectives:

1. MAP for AFP4 1992,
2. Draft Construction Site Assessment Report for the Die Yard Zone (Intellus, 1987), and
3. Final Feasibility Study (RUST Geotech, 1993).

Summaries of each of these reports are presented in Appendix A. The following is a brief description of the reports, as they pertain to DP13.

MAP, 1992

This report states that an interim soils removal action was performed at DP13 in 1984. The purpose of the action was to eliminate a contaminant source. The interim remedial action involved removal of 1,100 yd^3 of contaminated soils. An additional 4,990 yd^3 of contaminated soils are specified for removal.

Draft Construction Site Assessment Report for the Die Yard Zone (Intellus, 1987)

The purpose of this report was to propose a comprehensive solution for groundwater and soil management at the Die Yard Zone during the Waste Treatment Facility and Hazardous Material Storage Building construction at AFP4. The report addressed the following project objectives:

1. Evaluate the potential impact of construction on the Die Yard Zone Upper Zone groundwater movement and propose control measures, as necessary, to mediate potential undesirable impacts;
2. Evaluate the potential need for construction dewatering and propose control measures, as necessary, to accomplish this task and determine methods, as necessary, to treat the potentially contaminated groundwater;
3. Evaluate the potential impacts associated with the excavation and handling of potentially contaminated soil and propose control

measures, as necessary, to mediate potential undesirable impacts; and

4. Assess the potential impact construction may have on future remediation activities.

Several alternatives were evaluated for groundwater and soils management at the Die Yard Zone based on cost and efficiency. Alternative W-1 was selected from the following comprehensive list of alternatives:

1. Alternative W-1, Groundwater Collection and Treatment--eight dewatering wells will be installed outside and surrounding the proposed excavation. The collected groundwater will be filtered using a dual bag-type filter to remove the suspended solids. Effluent from the filter will be treated using GAC to remove the organic contaminants. The treated effluent from the activated carbon will be discharged to the AFP4 Industrial Wastewater Treatment Facility. The proposed Equalization Basin excavation can be constructed in-the-dry using the dewatering and water treatment alternative. In the dewatering and water treatment alternative, eight dewatering wells will be installed outside the proposed excavation area. The collected water will then be treated using GAC.
2. Alternative W-2, Groundwater Diversion Using Slurry Walls--the upper zone groundwater flow will be diverted around the proposed Equalization Basins excavation via a slurry wall. The slurry wall would be constructed exterior to the proposed excavation area perimeter. The wall will be approximately 24 inches wide.
3. Alternative W-3, Groundwater Diversion Using Concrete Diaphragm Walls--a concrete diaphragm wall system will be designed and used as the permanent perimeter retaining wall for the proposed Equalization Basins. The diaphragm walls, keyed into the bedrock, will divert the Upper Zone groundwater around the Equalization Basins excavation.

4. Alternative W-4, No action.

The following two alternatives were developed for soils at the Die Yard Zone. Alternative S-1 was selected.

In Alternative S-1 (soil segregation and onsite aeration), soils above the capillary zone will be sampled and segregated as necessary, into uncontaminated and contaminated waste piles using an organic vapor analyzer (OVA). Soils containing the organic contaminants will be aerated, and the remaining clean soils will be used as fill or disposed of.

In Alternative S-2 (disposal of soils in a hazardous waste landfill), the operation will include segregation of soils, as previously described in Alternative S-1. All soils having a TCE concentration greater than a previously negotiated limit (the limit was not defined in the report) will be disposed of in a hazardous waste landfill.

Final Feasibility Study (RUST Geotech, 1993)

The 1993 FS specifies that approximately 4,750 yd^3 of soil contaminated with TCE and an unknown amount of overlying cleanup require removal. An additional 360 yd^3 of methylene chloride-contaminated soils were identified.

3.4.2 REMEDIATION PROJECT OBJECTIVES

The objective of the interim remedial action was to eliminate a contaminant source. The objective of future remedial efforts will be to remediate contaminated groundwater and soils to levels below PRGs.

3.4.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Approximately 1,100 yd^3 of soils were removed as part of the interim remedial action. However, the action did not succeed in removal of all contaminated soils. An estimated 4,990 yd^3 of contaminated soils are specified for removal.

3.4.4 PROJECT ACCOMPLISHMENTS

A total of 1,100 yd^3 of contaminated soils were removed.

3.4.5 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data were developed as part of the interim remedial action conducted in 1984.

3.4.6 RECOMMENDATIONS FOR ADDITIONAL STUDIES OR PROJECTS

The 1993 FS concluded that an additional volume of contaminated soils require removal from the site.

3.4.7 PROJECT STATUS

The interim remedial action was completed in 1984. The status of the specified removal action for 4,990 yd^3 of contaminated soils was not identified in the literature review. The status of the implementation of the selected alternatives described in Section 3.4.1 is not documented in the file material.

3.4.8 SCHEDULE

The interim remedial action was completed in 1984. The MAP projects that a Proposed Plan for DP13 and FDTA 5 will be completed in November 1993 and a ROD will be completed in June 1994. No information updating the schedule for the 1992 MAP was present in the project files. Because DP13 and FDTA 5 were not considered to warrant remedial action, decision documents for these sites may not be necessary.

3.4.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.4.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

The MAP specifies that 4,990 yd^3 of contaminated soils need to be removed. The FS references a volume of 4,750 yd^3. Furthermore, the FS does not evaluate

alternatives for DP13 soils. The FS specifies that 360 yd^3 of methylene chloride-contaminated soils exist, yet no PRG was reported in the FS for methylene chloride. Therefore, it is unknown if the methylene chloride-contaminated soils will need remediation. Alternatives for methylene chloride-contaminated soils were not evaluated in the FS.

3.5 FSA-1 AND FSA-3

Although the remedial actions performed at FSA-1 and FSA-3 are separate actions, they are both reported in this section because of contaminant and treatment similarities and because pertinent reports for these sites addressed the sites similarly.

FSA-1

FSA-1 is located south and east of Facilities Building 14 (Figure 3.5-1). Groundwater in this area reportedly became contaminated by fuels leaking from the underground distribution system from the mid-1970s to the early 1980s. The piping, consisting of 4-inch-diameter JP-4 lines, was abandoned in 1988. In addition, a fuel pumping station and two 12,000-gal-capacity USTs, Nos. 19 and 20, were removed prior to December 22, 1988, which was the effective date of Federal Subtitle I regulations. Vadose and saturated zone soils samples collected in the vicinity of the former USTs indicate the presence of 2-butanone, toluene, chloroform, ethylbenzene, xylene, and bromodichloromethane.

A groundwater treatment system is in place at FSA-1. The system has a design capacity of 70 gpm and consists of an oil/water separator, air stripper, and two 10,000-lb carbon adsorption units. This treatment system also treats water collected at French Drain Nos. 1 and 2. Two groundwater extraction wells, which were formerly monitor wells, are recovering groundwater at FSA-1. A vacuum extraction system was put into operation in December 1992 to remove fuel vapors from the soils (Lockheed, 1994).

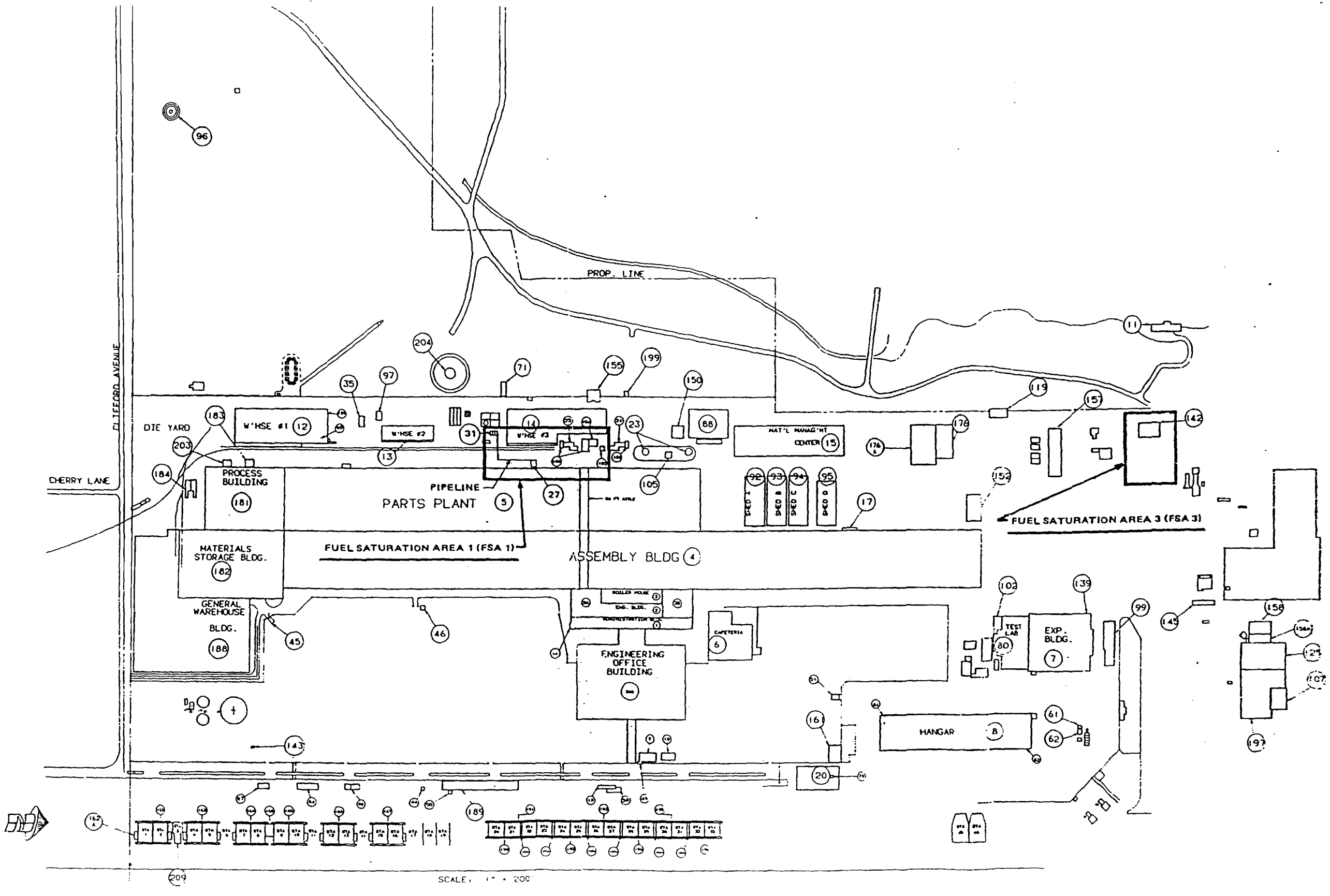

Figure 3.5-1 FSA 1 AND FSA 3 LOCATION PLAN

FSA-3

FSA-3, located immediately east of Meandering Road between Facilities Buildings 157 and 142 (Figure 3.1-2), is contaminated by fuels from buried pipelines that leaked during the 1970s and early 1980s. The FSA-3 area has numerous underground utilities and several UST sites. Estimates of the plume of contaminated material in the vadose zone have been calculated to be 5,200 yd^3 of soils contaminated with JP-4. An additional 1,200 yd^3 of soils contaminated with JP-4 are also located here.

A groundwater treatment system, with a design capacity of 20 gpm and consisting of an oil/water separator and a low-profile air stripper is currently in operation at FSA-3. Eight groundwater extraction wells have been installed at FSA-3 to recover groundwater. All but one of these extraction wells is a converted monitor well. An interim vapor extraction system was put into operation in June 1992 and taken offline in November 1992. The objective of this interim action was to recover and destroy fuel vapors in soil until the groundwater pump and treat at FSA-3 was operational. A long-term vacuum extraction system was put into service in December 1992.

3.5.1 SUMMARY OF REPORTS FOR FSA-1 AND FSA-3

Four reports were considered to contain information pertinent to the Task 2 objectives:

1. Draft Remedial Action Plan and Conceptual Documents for Fuel Saturation Areas No. 1 and 3 (Intellus, 1986);
2. Three-Site Remedial Action Plan (RAP) Review Action Items, Attachments A, B, and C (Intellus, 1986);
3. Evaluation of Condenser Water Pipeline and Interim Remedial Measures, Fuel Saturation Area No. 3 (Hargis & Associates, Inc., 1988);

4. Engineering Report, Remedial Action for Fuel Saturation Areas No. 1 and 3 and Treating Leachate from French Drain No. 1 (HDR, 1988); and
5. MAP for AFP 4, 1992.

Detailed summaries of each of these reports are presented in Appendix A. The following paragraphs include a brief description of the reports, as they pertain to FSA-1 and FSA-3.

Draft Remedial Action Plan and Conceptual Documents for Fuel Saturation Areas No. 1 and 3 (Intellus, 1986)

The IRP Phase IV work effort was divided into two stages, Phase IV-A and IV-B. This report was limited to the Phase IV-A work effort at FSA-1 and FSA-3. Phase IV-A work for groundwater remediation was conducted in four stages: Stage 1--screen control measures, Stage 2--develop and evaluate detailed alternatives, Stage 3--select preferred alternatives, and Stage 4--describe preferred alternative.

In Stage 1, the control measures were screened to address the fuel floating on the shallow groundwater and the dissolved organic constituents in the upper zone aquifer. The primary criteria used to evaluate the control measures were technical feasibility, cost, environmental impact, public health risk, and regulatory compliance.

Stage 2 work was conducted to develop and evaluate the alternatives that passed the initial level of screening. The four alternatives retained from preliminary screening were evaluated in detail for engineering feasibility, cost analysis, public health analysis, and environmental assessment and regulatory requirements. A narrative matrix for the alternatives is presented in Table 3.5-1.

Table 3.5-1. Evaluation of Potential Remedial Action Alternatives at FSA 1 and FSA 3

Alternative	Cost	Technical Feasibility	Environmental Impact	Public Health Risk	Regulatory Compliance	Engineering Judgement	Retain Option
1. No Action - Monitoring and Site Maintenance	1	1	5	5	5	17(1)	Yes
2. In-situ bioreclamation of soil and water	3	4	2	2	2	13	Yes
A. French drain/wells for contaminated groundwater collection							
B. Gravity separation of fuel and water							
C. Reinject water with microbes and nutrients, etc.							
D. Dispose of or reclaim fuel							
3. Onsite contaminated groundwater treatment/soil leaching	2	2	3	3	2	12	Yes
A. Use French drains/well for contaminated groundwater collection							
B. Gravity separation of fuel and water							
C. Treat water using air stripping and/or activated carbon							
D. Dispose of or reclaim fuel							
4. Offsite treatment of contaminated groundwater and no action on soil	4	1	4	4	3	16	No
A. Use French drains/wells for contaminated groundwater collection							
B. Transport contaminated water offsite to a commercial treatment and disposal facility							
5. In-situ soil bioreclamation and onsite contaminated groundwater treatment	4	3	2	2	2	13	Yes
A. Use French drains/wells for contaminated groundwater collection							
B. In-situ soil bioreclamation							
C. Physical treatment of water using:							
1. Gravity separation 2. Air stripping and/or activated carbon							
D. Reuse of treated water by AFP No. 4							
E. Dispose of or reclaim fuel							
6. Onsite soil and groundwater incineration	5	4	2	2	2	15(2)	No
A. Excavate soil and incinerate							
B. Collect contaminated groundwater with French drains/wells and incinerate							

Notes:

(1) Questionable regulatory approval for contaminant migration. Lowest cost option.
(2) Difficult and costly to excavate soil from under buildings. Incineration is costly and permitting will take a great deal of time.

Sources: Intellus, 1986; ESE.

A preferred alternative was selected in Stage 3 for groundwater remediation at FSA-1 and FSA-3. The recovery system for FSA-1 groundwater consists of two extraction wells with submersible pumps, and the recovery system for FSA-3 consists of two french drains (interceptor trenches), sumps, and submersible pumps. The major components of the centralized treatment system in the selected alternative for both FSA-1 consists of an oil/water separator and air stripping followed by a liquid-phase GAC unit. The effluent from the treatment system will be discharged to the AFP4 process makeup water. The treatment alternative was selected based on the following criteria:

1. The efficiency is extremely high in a variety of influent conditions and is not susceptible to toxics;
2. Various units can be added to the treatment system, as needed;
3. The alternative will allow AFP4 to reduce its demand for city-supplied water; and
4. The reclaimed jet fuel may be used onsite as a supplemental energy source.

Three-Site RAP Review Action Items, Attachments A, B, and C (Intellus, 1986); In this report, responses to the comments were presented on the draft RAP completed under the Phase IV-A investigation. The report included a cover letter and the following four attachments (Attachments A, B, C, and D):

1. Calculations and design basis for selected conceptual design (Attachment A);
2. Capital cost estimates for Alternatives 2, 3, and 4 (Attachment B);
3. Present-worth analysis for Alternatives 1, 2, 3, and 4 (Attachment C): and
4. Response to unresolved comments on the draft RAP (Attachment D).

Evaluation of Condenser Water Pipeline and Interim Remedial Measures, Fuel Saturation Area No. 3 (Hargis & Associates, Inc., 1988)

A summary of the previous investigations at FSA-3 was presented in this report (Hargis & Associates, Inc., 1985; Intellus, 1986; and Radian Corporation, 1987). Due to insufficient data from the previous studies, further investigation was conducted to define the hydrological conditions at FSA-3. The investigation involved drilling two soil borings (FSA3-5 and FSA3-9) and 11 monitor wells (FSA3-1, FSA3-2, FSA3-3, FSA3-4, FSA3-5, FSA3-6, FSA3-7, FSA3-8, FSA3-9, FSA3-11, and FSA3-12) at FSA-3. The following conclusions were made, based on the investigation results:

1. Existing buried pipelines below the groundwater table are potential conduits for the migration of contaminated groundwater in the vicinity of FSA-3.
2. The proposed pipeline excavation will encounter groundwater and free product from approximately 60 ft west of soil boring FSB-1 to 50 ft east of monitor well FSA3-1.
3. An interceptor trench could be installed in the same trench as the pipeline, but the location of the proposed pipeline is not the optimum location for recovery of free-product and contaminated groundwater.

It was recommended that the interceptor trench not be installed in the same trench as the pipeline and additional data be collected to delineate the distribution of free-product so that an optimum location for an interceptor trench can be determined.

Engineering Report, Remedial Action for Fuel Saturation Areas Nos. 1 and 3 and Treating Leachate from French Drain No. 1 (HDR, 1988)

An engineering report was prepared and intermediate remedial actions were developed for groundwater at FSA-1, FSA-3, and FD-1. The remedial actions were divided into recovery and treatment systems. Five recovery and five

treatment alternatives were evaluated for technical feasibility and cost effectiveness.

The alternatives evaluated for the recovery system include the following:

1. Extraction of groundwater using the existing two wells at FSA-1,
2. Extraction of groundwater using eight new wells at FSA-3,
3. Extraction of groundwater using the existing eight wells at FSA-3,
4. Extraction of groundwater using the existing seven wells and one new well at FSA-3, and
5. Extraction of groundwater using the existing seven wells and two new wells at FSA-3.

The alternatives evaluated for the treatment system include the following:

1. Alternative 1A--centralized treatment system using air stripping followed by liquid and vapor-phase GAC;
2. Alternative 1B--centralized treatment system using liquid-phase carbon;
3. Alternative 2--trucking versus pumping of groundwater to the centralized treatment system;
4. Alternative 3--localized treatment systems at FSA-1 (for groundwater from FSA-1 and FD-1) and FSA-3; and
5. Alternative 4--option 1B, including onsite regeneration of activated carbon.

Groundwater extraction using the seven existing wells and one new well was selected under the recovery system evaluation of alternatives. Alternative 1B was selected for the treatment system alternative evaluation. Alternative 1B consists of the following treatment components:

1. Gravity separators to separate the recovered free-product from groundwater at FSA-1, FSA-3, and FD-1;

2. Equalization tanks to store the recovered free-product and the separated groundwater; and
3. Two 10,000-lb GAC units to treat the separated groundwater.

The treatment system was designed based on a 20-gpm influent rate at a cost of $1,360,000 for a total of 3 years. The process and instrumentation diagram for the treatment system is presented in Figure 3.1-2.

MAP for AFP4, 1992

An interim vapor extraction system was put into operation in June 1992 and taken offline in November 1992. The objective of this interim action was to recover and destroy fuel vapors in soil until the groundwater pump and treat at FSA-3 was operational.

3.5.2 REMEDIATION PROJECT OBJECTIVES FOR FSA-1 AND FSA-3

The objectives of interim groundwater treatment at FSA-1 and FSA-3 are to remediate contaminated groundwater. The objective of the interim and more permanent soil treatment systems at FSA-1 and FSA-3 was to remove fuel vapors in soil.

3.5.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

The interim groundwater treatment systems at FSA-1 and FSA-3 are currently in operation and successfully treating groundwater. No file information was available to determine the effectiveness of the interim vapor extraction system at FSA-3.

3.5.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

A performance evaluation for the soil treatment systems at FSA-1 and FSA-3 was performed in October 1993. Data from this pertinent evaluation study is currently not available (Lockheed, 1994).

3.5.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

Lockheed is currently preparing a bid package for a performance evaluation contract so that a contractor can periodically evaluate the performance of the FSA-1 and FSA-3 groundwater extraction and treatment systems. Additionally, Lockheed expects to perform groundwater pump tests in January 1994. Information from the performance test will help to fine-tune the treatment systems.

3.5.6 PROJECTS RESULTING FROM PROJECT

No additional projects, resulting from remediation of FSA-1 and FSA-3, were identified in the literature reviewed.

3.5.7 PROJECT STATUS

The operation of the interim vacuum extraction system at FSA-3 ceased in November 1992. More permanent vacuum extraction systems were put into service at FSA-1 and FSA-3 in December 1992. The operation of the groundwater treatment systems at FSA-1 and FSA-3 was initiated in October 1992 and are expected to operate indefinitely. Initial estimates of the required remediation time for FSA-1 and FSA-3 were less than 1 year. These initial estimates were inaccurate. Lockheed will optimize the interim groundwater treatment systems based on data collected through the performance evaluation contract (Lockheed, 1994).

3.5.8 SCHEDULE

Operation of the interim soil vapor extraction system ceased in November 1992. The permanent groundwater and soil treatment systems at FSA-1 and FSA-3 will continue to operate indefinitely.

The MAP projects that a Proposed Plan for this site will be completed in November 1993 and a ROD will be completed in June 1994. Although decision

documents for both sites are planned for submittal at the same time, FSA-1 is part of OU 1 and FSA-3 is part of OU 3, and the sites will therefore be addressed by two different decision documents. No information updating the schedule for the 1992 MAP was present in the project files.

3.5.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.5.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

Remediation of contaminated soils and groundwater at this site was not addressed in the 1993 FS.

3.6 LANDFILL NO. 3

LF03 (depicted in Figure 3.6-1) was used to discard a variety of waste, including hazardous waste, consisting of mixed oils and solvents from 1942 to 1945. The landfill material is primarily soil fill of variable nature, with clay, silt, sand, and gravel all being reported from drilling logs. Some plant material and trash are reported but do not appear to be major components. Asphalt and concrete rubble also occur but apparently only as smaller fragments that are not large enough to stop drilling. Large blocks of broken concrete are visible on the steep western slope of the landfill, apparently placed there to prevent erosion.

Contamination was first detected at LF03 in 1982 after a local citizen detected odors at a 36-inch storm drain that passed through the landfill and drained into Meandering Creek Road. Subsequent analysis of water samples collected from the outfall identified several contaminants, the most prevalent of which was TCE (Hargis & Associates, Inc., 1985a). Remedial action resulted in the lining of the storm drain where it passed between LF01 and LF03 in late 1983 and excavation of the former Waste Oil Pits (located in LF01) in 1983.

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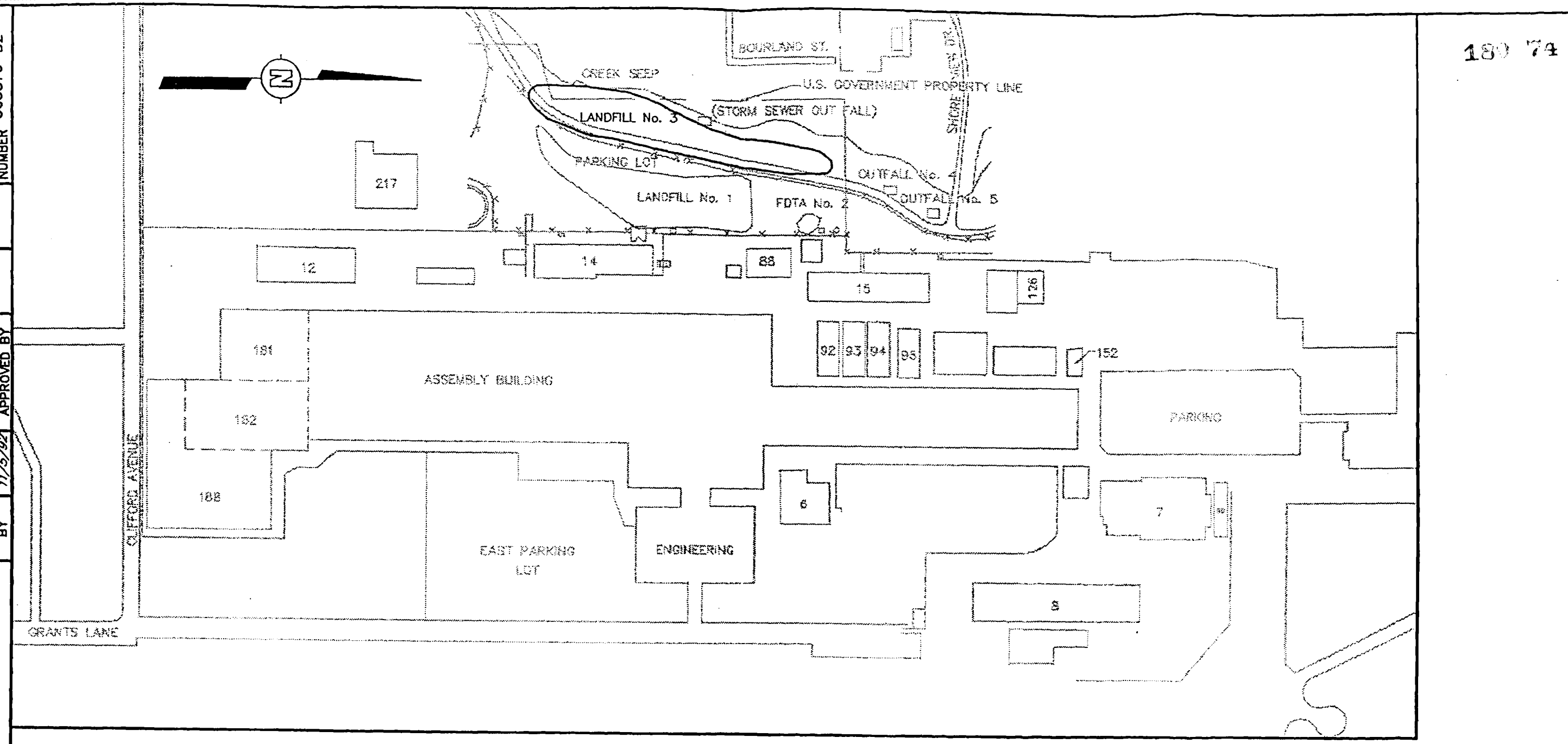

LEGEND:

——— BOUNDARY OF LANDFILL NO. 3

SCALE
0 400 800 FEET

Figure 3.6-1 LOCATION PLAN FOR LF03

132298

Soil and groundwater media are contaminated with fuels, solvent-related compounds, and traces of metals. Based on the available information at the site, the Air Force Center for Environmental Excellence (AFCEE) envisioned an impermeable subsurface barrier system with a groundwater extraction system as the conceptual solution for groundwater remediation at LF03.

An interim recovery well was installed at the site in October 1992 to recover free product (DNAPL) in groundwater to be disposed of offsite.

3.6.1 SUMMARY OF REPORTS FOR LF03

Three reports were considered to contain information pertinent to the Task 2 objectives:

1. Design Plan for Subsurface Barrier Wall at Landfill No. 3 (IT, 1993);
2. Final Feasibility Study for AFP4 (RUST Geotech, 1993); and
3. MAP for AFP4, 1992.

Detailed summaries of each of these reports are presented in Appendix A. The following is a brief description of the reports, as they pertain to LF03:

Design Plan for Subsurface Barrier Wall at Landfill No. 3 (IT, 1993)

A preliminary design strategy for groundwater remediation at LF03 was presented in this report. Under this strategy, the following alternatives were considered for the control of offsite migration of groundwater at LF03:

1. Slurry wall (Figure 3.6-2),
2. High-density polyethylene (HDPE) wall (Figure 3.6-3),
3. Groundwater extraction system (Figure 3.6-4), and
4. Leachate collection trench (Figure 3.6-5).

These alternatives were evaluated based on the following seven criteria:

1. Overall protection of human health and the environment,
2. Compliance with ARARs,

FT. WORTH AFP4/CARSWELL

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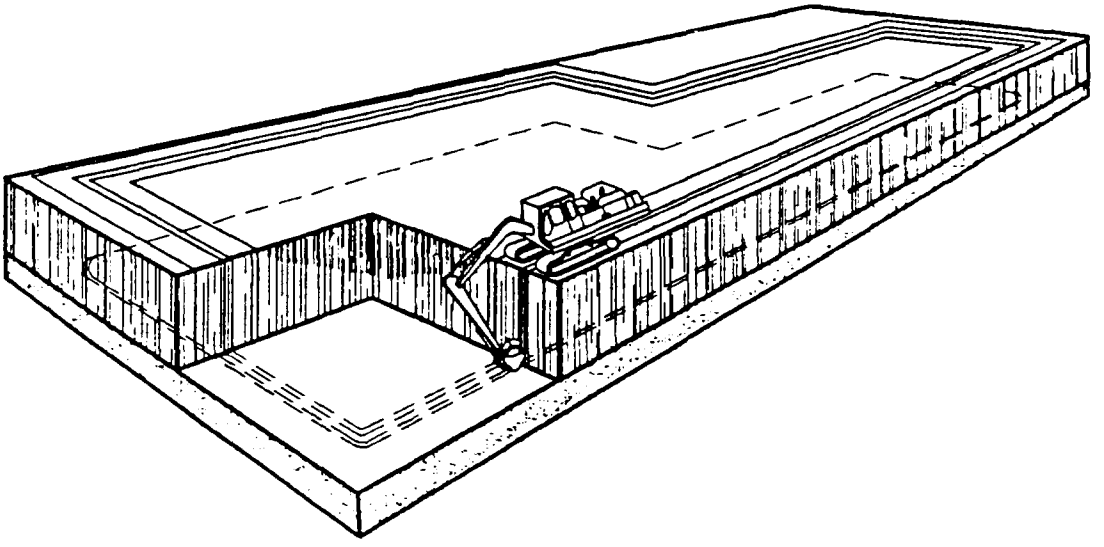

SLURRY WALL SCHEMATIC
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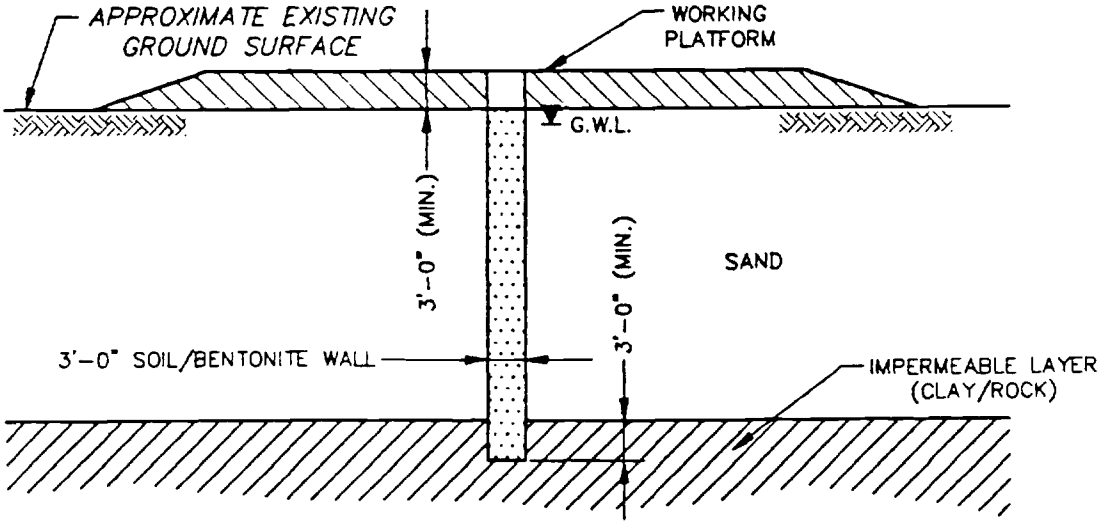

CROSS-SECTION
NOT TO SCALE

Figure 3.6-2
SLURRY WALL
SCHEMATIC AND CROSS-SECTION
LANDFILL #3
SOURCES: IT CORP., 1993; ESE.

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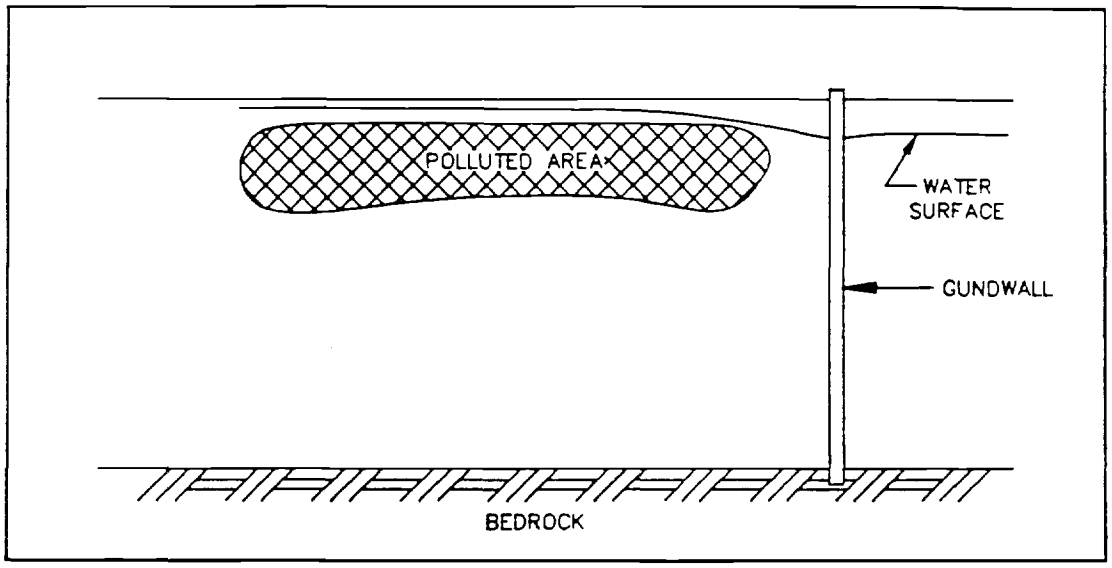

GUNDWALL CROSS-SECTION

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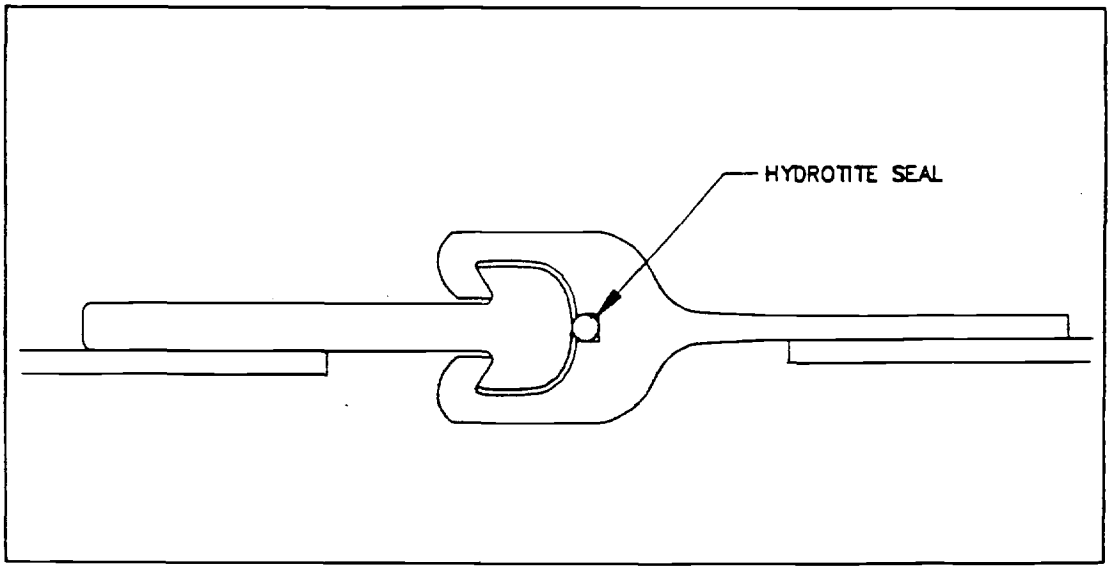

GUNDWALL INTERLOCK

NOT TO SCALE

Figure 3.6-3
GUNDWALL CROSS-SECTION
& INTERLOCK
LANDFILL #3
SOURCES: IT CORP., 1993; ESE.

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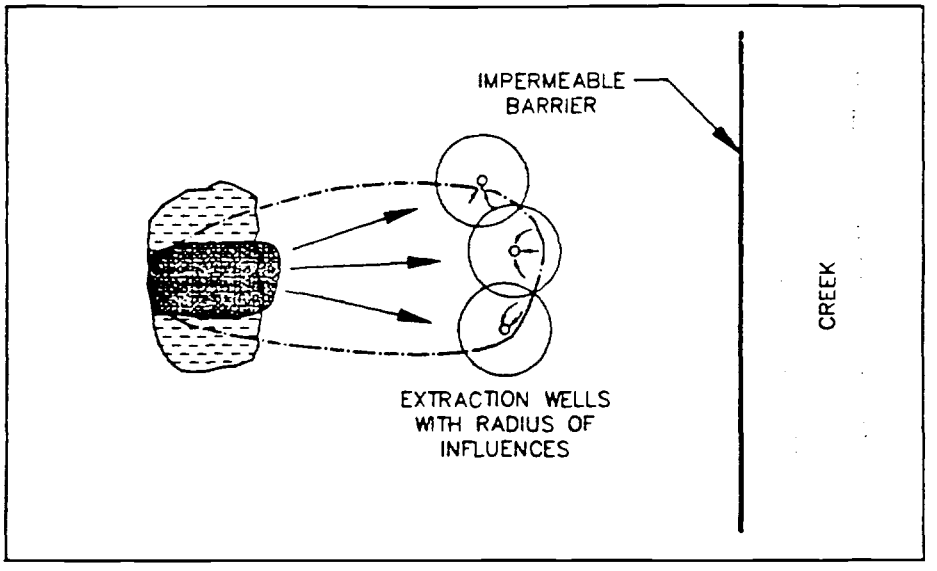

PLAN VIEW
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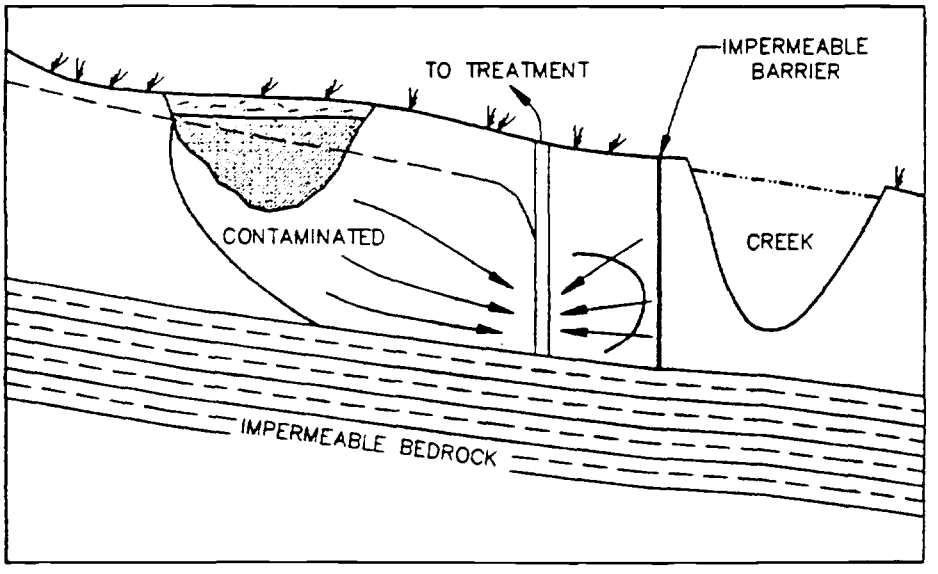

CROSS-SECTION
NOT TO SCALE

Figure 3.6-4
EXTRACTION WELLS
AND IMPERMEABLE BARRIER
PLAN VIEW AND CROSS-SECTION
LANDFILL #3
SOURCES: IT CORP., 1993; ESE.

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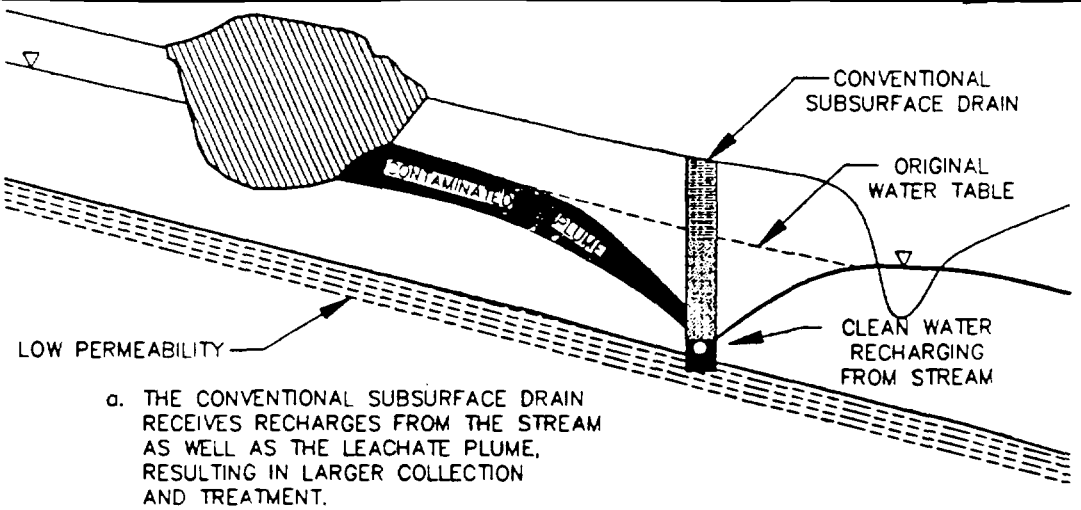
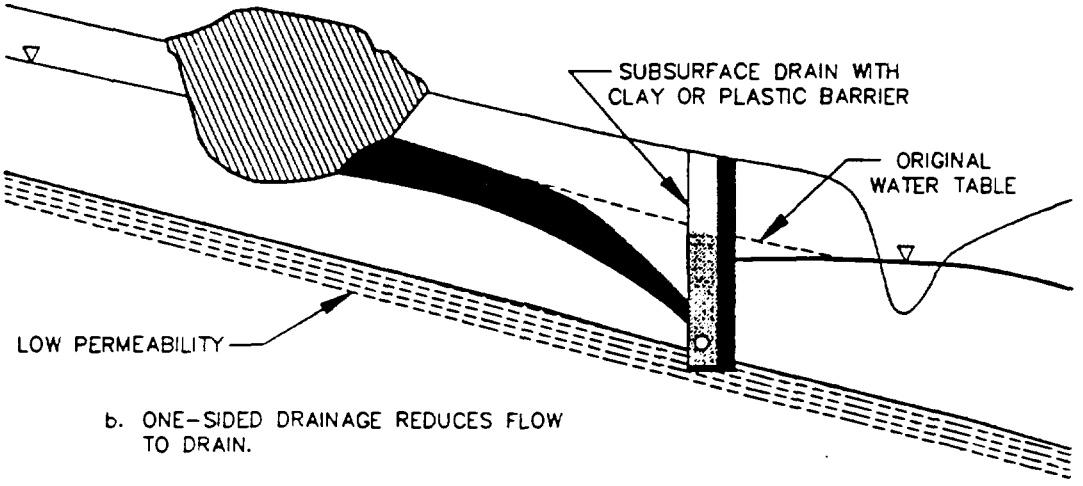


a. THE CONVENTIONAL SUBSURFACE DRAIN RECEIVES RECHARGES FROM THE STREAM AS WELL AS THE LEACHATE PLUME, RESULTING IN LARGER COLLECTION AND TREATMENT.



b. ONE-SIDED DRAINAGE REDUCES FLOW TO DRAIN.

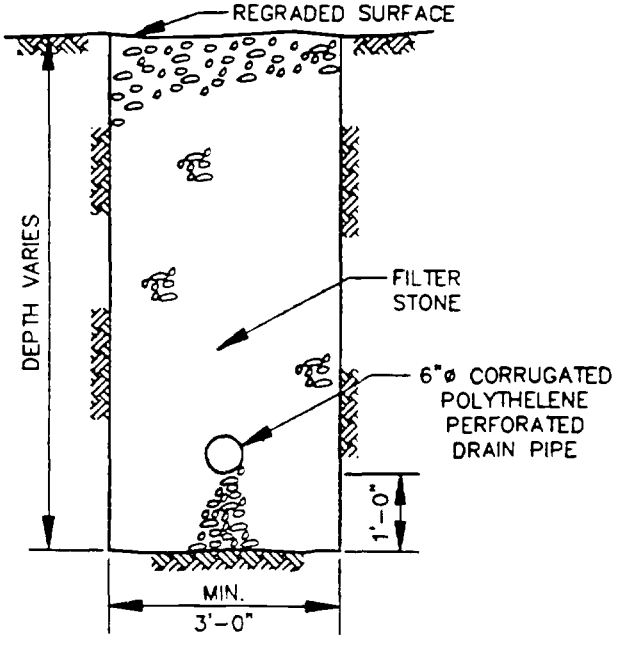


Figure 3.6-5
LEACHATE COLLECTION TRENCH SECTIONS LANDFILL #3
SOURCES: IT CORP., 1993; ESE.

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3. Long-term effectiveness and permanence,
4. Reduction of TMV,
5. Short-term effectiveness,
6. Implementability, and
7. Cost.

No recommendations were made for the selected alternative in this report. However, it was stated that a recommendation will be submitted to AFCEE in the form of a report titled Confirmation of Design Strategy. The implementation of the conceptual design (Phase 1-B) would then be undertaken following the approval of the design by AFCEE.

Final Feasibility Study for AFP4 (RUST Geotech, 1993)

An FS was prepared in 1993 for sites at AFP4. No remediation was recommended for soils media at LF03. However, the report states that approximately 16,000 yd^3 of contaminated soils are present. At total of 15,900 yd^3 of material is contaminated with organics, and 3,800 yd^3 of soils are estimated to be contaminated with inorganics.

The remedial response objective for contaminated groundwater is to prevent human exposure to TCE and DCE in concentrations exceeding PRGs.

Applicable remedial technologies for soil and groundwater were identified and screened based on technical implementability and effectiveness. Effectiveness was based on (1) the potential effectiveness of process options in handling the estimated volumes of media and satisfying the identified remedial action objectives, and (2) the proven reliability of the process with respect to the contaminants at AFP4.

The following four alternatives were developed for groundwater:

1. No action,

2. Physical treatment (air stripping),
3. Chemical treatment (UV light and oxidation), and
4. Biological treatment (aboveground bioreactors).

The assembled alternatives were then evaluated in detail against the following nine evaluation criteria: (1) overall protection of human health and the environment, (2) compliance with ARARs, (3) long-term effectiveness, (4) reduction of TMV, (5) implementability, (6) short-term effectiveness, (7) cost, (8) state acceptance, and (9) community acceptance. No final recommendations for a preferred alternative were presented in the report.

MAP for AFP4, 1992

The 1992 MAP reported that an interim DNAPL recovery well was installed at LF03 to recover free product. Recovered product will be disposed of offsite. The MAP also reported that a slurry wall would be in the design/installation phase in 1993.

3.6.2 REMEDIATION PROJECT OBJECTIVES

The objective of the interim DNAPL recovery well is to recover free product from the groundwater. A containment technology is currently being evaluated for the landfill, for the purposes of containing the contaminant plume.

3.6.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

The DNAPL recovery well recovered approximately 1 gal of DNAPL over a 1-year period. Due to the poor performance of the system, the DNAPL recovery well was taken out of service (Lockheed, 1994).

3.6.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

In a 1993 report (IT), several alternatives were evaluated to control the offsite migration of groundwater at LF03 (Section 3.7.1 for details of the alternatives). The 1993 FS addressed only the groundwater contamination at LF03. Four

groundwater alternatives were evaluated. No recommendation of a preferred alternative has been made.

3.6.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

A combination of a slurry wall and groundwater extraction is being considered (MAP, 1992). Another alternative being considered involves performing vacuum extraction and groundwater extraction at the landfill, without the aid of a slurry wall. Containment of the entire site with a slurry wall may be technically infeasible due to slope stability limitations at the steep slope portion of the site. IT is recommending additional extraction wells and a vacuum extraction system, with product recovery wells, to be used in conjunction or instead of a slurry wall. The landfill essentially consists of three separate zones. IT is proposing to test each of the three zones using a total of four extraction wells and 20 monitor wells. Results from this testing, along with corresponding recommendations, are anticipated to be available in early spring 1994. There is some speculation that the plume may not be entirely from the landfill. No further efforts for further extent of contamination definition are known of at this time (IT, 1994).

3.6.6 PROJECTS RESULTING FROM THE PROJECT

No remedial projects are known to have occurred in response to the operation of the interim remedial action involving DNAPL recovery. A system for mitigating contaminated groundwater at the site is in the advanced phases of planning.

3.6.7 PROJECT STATUS

The DNAPL recovery well was taken out of service. The implementation of the remedial action involving containment, and/or the use of groundwater and vacuum extraction wells is still in the planning phase.

3.6.8 SCHEDULE

No file information pertaining to the schedule of the DNAPL well was available. Field studies are scheduled to evaluate groundwater and vacuum extraction pumping during the first quarter of 1994. Data are expected to be available in the early spring of 1994. Further scheduling of remedial activities was not available in the records reviewed.

The MAP projects that a Proposed Plan for this site will be completed in November 1993 and a ROD in June 1994.

3.6.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this project are in IRPIMS.

3.6.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

The 1993 FS did not address any of the remedial strategies being contemplated at LF03.

3.7 EAST PARKING LOT PLUME

The records search to locate the potential environmental problems associated with waste disposal practices during the Phase I investigation was completed in 1984 (CH2M Hill, 1984). The results of the Phase I investigation identified 21 sites as the sources of contamination due to past waste disposal practices. The East Parking Lot is one of the 21 sites identified for remediation under the IRP. Figure 3.7-1 shows the location of the East Parking Lot at AFP4.

During the Phase II investigation, the extent and degree of contamination at the identified sites was completed (Radian, 1987). Groundwater samples were collected and analyzed from both the shallow aquifer and the Paluxy aquifer. A total of 47 groundwater monitor wells were sampled and analyzed for the following constituents:

1. VOCs,

1 LANDFILL LF01
2 LANDFILL LF02
3 LANDFILL LF03
4 LANDFILL LF04
5 FIRE DEPT TRAINING AREA 2, FDTA-2
6 FIRE DEPT TRAINING AREA 3, FDTA-3
7 FIRE DEPT TRAINING AREA 4, FDTA-4
8 FIRE DEPT TRAINING AREA 5, FDTA-5
9 FIRE DEPT TRAINING AREA 6, FDTA-6
10 CHROME PIT-1
11 CHROME PIT-2
12 CHROME PIT-3
13 DIE YARD CHEMICAL PITS, (DYCP)
14 FUEL SATURATION AREA 1, FSA-1
15 FUEL SATURATION AREA 2, FSA-2
16 FUEL SATURATION AREA 3, FSA-3
17 FORMER FUEL STORAGE AREA, FFSA
18 SOLVENT LINES
19 NUCLEAR AEROSPACE RESEARCH FACILITY, (NARF)
20 WASTEWATER COLLECTION BASINS, WWCB
21 WEST COMPASS ROSE
22 EAST PARKING LOT, FLIGHT LINE
23 FRENCH DRAIN
24 JET ENGINE TEST STAND, (JETS)
25 UST #19
26 UST #20
27 UST #24A
28 UST #24B
29 UST 25A
30 UST 25A
AOC BLDG 181
AOC 204

CITY BOUNDARY
FORT WORTH
0 400 800
SCALE FEET
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 6
ZONE 7
PARTS PLANT
ASSEMBLY BUILDING
ENGINEERING
EAST PARKING LOT
NORTH PARKING LOT
RUNWAY No.13O NORTH
LAKE WORTH

Figure 3.7-1
AFP4 IRP UST AND AOC SITES
SOURCE: ESE.

ESE Environmental Science & Engineering, Inc.
A CILCORP Company

2. Base/neutral organic compounds (BNAs),
3. Organic compounds,
4. Trace metals,
5. Oil/grease and total fuel hydrocarbons, and
6. Common ion constituents.

Results of the groundwater investigation have confirmed the presence of TCE, DCE, and chromium at the East Parking Lot. Tables 3.7-1, 3.7-2, and 3.7-3 present the chemical analyses of the contaminants present in the plumes at the East Parking Lot and the Paluxy aquifer. The distribution of TCE contamination at the East Parking Lot is shown in Figure 3.7-2.

A groundwater treatment system, consisting of eight extraction wells and an air stripper, is currently under construction. A low profile air stripper has been installed inside the assembly building to treat groundwater that seeps into an existing pit.

3.7.1 SUMMARY OF REPORTS FOR EAST PARKING LOT PLUME

Six reports were considered to contain information pertinent to the Task 2 objectives:

1. Alternatives for East Plume Groundwater Remediation (Tyndall AFB, 1991);
2. Draft Contract Quality Control Plan Addendum, Groundwater Remediation of Window Area (IT, 1992);
3. Groundwater Remediation of Window Area--50% Design Package (IT, 1993);
4. Final Feasibility Study for AFP4 (RUST Geotech, 1993);
5. East Parking Lot, Installation of Groundwater System (IT, 1993); and
6. Groundwater Remediation of Window Area--100% Design Package (IT, 1993).

Table 3.7-1. Upper-Zone Monitor Wells Within the East Parking Lot Plume at Which TCE Concentrations Exceeded the CRQL

Site ID	Sample ID	Sample Date	Result (µg/L)
F-218	NAA157	27-Apr-90	3,000
F-219	NAA158	26-Apr-90	67
F-219	NAA260	26-Apr-90	71
HM-029	NAA162	27-Apr-90	1,400
HM-031	NAA163	27-Apr-90	920
HM-047	NAA164	27-Apr-90	4,400
HM-047	NAA269	27-Apr-90	7,100
HM-056	NAA168	28-Apr-90	150
HM-060	NAA169	27-Apr-90	170
HM-071	NAA172	28-Apr-90	420
HM-086	NAA173	28-Apr-90	250
HM-087	NAA174	29-Apr-90	350
HM-088	NAA175	01-May-90	6,700
HM-088	NAA271	01-May-90	6,000
HM-089	NAA176	01-May-90	4,500
HM-089	NAA261	01-May-90	4,800
HM-089	NAA272	01-May-90	3,600
HM-094	NAA180	29-Apr-90	19,000
HM-095	NAA181	25-Apr-90	1,900
HM-096	NAA182	25-Apr-90	1,200
HM-097	NAA183	25-Apr-90	440
HM-099	HM-99	25-Oct-91	720
HM-099	NAA185	25-Apr-90	2,100
HM-099	QM-006	14-Mar-91	1,200
HM-099	WQM004	05-Dec-90	2,300
HM-103	NAA186	01-May-90	1,900
HM-110	NAA188	01-May-90	23
HM-111	NAA189	30-Apr-90	410
HM-111	NAA273	30-Apr-90	420
HM-112	NAA190	30-Apr-90	3,700
HM-112	NAA274	30-Apr-90	3,400
HM-113	NAA191	30-Apr-90	380
HM-115	NAA192	01-May-90	110
HM-115	QM-008DL	18-Mar-91	240
HM-115	WQM010	07-Dec-90	320
HM-116	NAA193	01-May-90	860
HM-117	NAA194	01-May-90	640
HM-118	NAA195	01-May-90	180
HM-119	NAA196	01-May-90	25
HM-119	QM-009	18-Mar-91	62
HM-119	WQM007	06-Dec-90	66
HM-121	QM-010DL	19-Mar-91	450
HM-121	WQM009	06-Dec-90	500
HM-122	QM-011DL	19-Mar-91	870

Table 3.7-1. Upper-Zone Monitor Wells Within the East Parking Lot Plume at Which TCE Concentrations Exceeded the CRQL (Continued, Page 2 of 2)

Site ID	Sample ID	Sample Date	Result (µg/L)
HM-122	WQM022	10-Dec-90	890
HM-123	HM-123	25-Oct-91	2,000
HM-123	QM-012	19-Mar-91	120
HM-123	QM-012DL	19-Mar-91	1,900
HM-123	WQM011	07-Dec-90	2,100
HM-125	QM-013	18-Mar-91	66
HM-125	WQM024	10-Dec-90	36
HM-126	NAA203	01-May-90	2,600
HM-127	NAA204	01-May-90	55
LF04-02	LF04-02	27-Oct-91	3,800
LF04-04	LF04-04	27-Oct-91	1,800
LF05-01	LF05-01	28-Oct-91	880
LF05-5A	LF05-5A	27-Oct-91	1,600
W-128L	W-128L-01	12-Sep-91	19
W-128L	W-128L-11	19-Oct-91	19
W-131L	W-131L-01	11-Sep-91	6
W-131U	W-131U-11	24-Oct-91	21
W-131U	W-131U-11EB	24-Oct-91	11
W-131U	W-131U-12	24-Oct-91	20
W-137	W-137-01	16-Sep-91	76
W-137	W-137-11	24-Oct-91	56
W-145	W-145-01	15-Sep-91	8
W-149	W-149-01	18-Sep-91	20,000
W-149	W-149-11	17-Oct-91	21,000
W-150L	W-150-11D	20-Oct-91	4,100
W-150L	W-150L-01DL	14-Sep-91	4,900
W-151	W-151-01DL	13-Sep-91	510
W-151	W-151-11D	21-Oct-91	520
W-153	W-153-01	18-Sep-91	1500
W-153	W-153-02	18-Sep-91	1,300
W-153	W-153-11D	23-Oct-91	1,000
W-153	W-153-12D	23-Oct-91	1,000
W-154	W-154-01DL	14-Sep-91	2,800
W-154	W-154-02DL	14-Sep-91	2,700
W-154	W-154-11D	21-Oct-91	2,500
W-156	W-156-01DL	17-Sep-91	3,900
W-156	W-156-11D	22-Oct-91	3,600
W-158	W-158-01DL	14-Sep-91	15,000
W-158	W-158-11D	20-Oct-91	13,000
W-159	W-159-01DL	14-Sep-91	15,000
W-159	W-159-11D	20-Oct-91	31,000
W-160	W-160-01DL	14-Sep-91	480
W-160	W-160-11D	23-Oct-91	400
WP-07-10A	WP07-10A	27-Oct-91	1,300

Table 3.7-2. Upper-Zone Monitor Wells Within the East Parking Lot Plume at Which TCE Degradation Product Concentrations Exceeded CRQLs

Chemical Name	Site ID	Sample ID	Sample Date	Result (µg/L)
1,1-Dichloroethene	LF04-02	LF04-02	27-Oct-91	2
1,1-Dichloroethene	LF04-04	LF04-04	27-Oct-91	2
1,1-Dichloroethene	LF05-01	LF05-01	28-Oct-91	2
1,1-Dichloroethene	LF05-5A	LF05-5A	27-Oct-91	3
1,1-Dichloroethene	WP07-10A	WP07-10A	27-Oct-91	2
1,2-Dichloroethene	HM-099	QM-006	14-Mar-91	250
1,2-Dichloroethene	HM-099	WQM004	05-Dec-90	1,100
1,2-Dichloroethene	HM-115	QM-008	18-Mar-91	28
1,2-Dichloroethene	HM-115	WQM010	07-Dec-90	9
1,2-Dichloroethene	HM-121	QM-010	19-Mar-91	13
1,2-Dichloroethene	HM-121	WQM009	06-Dec-90	9
1,2-Dichloroethene	HM-122	QM-011DL	19-Mar-91	3800
1,2-Dichloroethene	HM-122	WQM022	10-Dec-90	290
1,2-Dichloroethene	HM-123	QM-012DL	19-Mar-91	1000
1,2-Dichloroethene	HM-123	WQM011	07-Dec-90	670
cis-1,2-Dichloroethene	HM-099	HM-99	25-Oct-91	440
cis-1,2-Dichloroethene	HM-123	HM-123	25-Oct-91	230
cis-1,2-Dichloroethene	LF04-02	LF04-02	27-Oct-91	390
cis-1,2-Dichloroethene	LF04-04	LF04-04	27-Oct-91	350
cis-1,2-Dichloroethene	LF05-01	LF05-01	28-Oct-91	110
cis-1,2-Dichloroethene	LF05-5A	LF05-5A	27-Oct-91	600
cis-1,2-Dichloroethene	W-131L	W-131L-01	11-Sep-91	7
cis-1,2-Dichloroethene	W-137	W-137-01	16-Sep-91	16
cis-1,2-Dichloroethene	W-137	W-137-11	24-Oct-91	29
cis-1,2-Dichloroethene	W-139L	W-139L-01	16-Sep-91	11
cis-1,2-Dichloroethene	W-139L	W-139L-11	19-Oct-91	9
cis-1,2-Dichloroethene	W-149	W-149-01	18-Sep-91	1,500
cis-1,2-Dichloroethene	W-149	W-149-11	17-Oct-91	1,500
cis-1,2-Dichloroethene	W-150L	W-150-11	20-Oct-91	19
cis-1,2-Dichloroethene	W-150L	W-150L-01	14-Sep-91	34
cis-1,2-Dichloroethene	W-151	W-151-01	13-Sep-91	28
cis-1,2-Dichloroethene	W-151	W-151-01DL	13-Sep-91	25
cis-1,2-Dichloroethene	W-151	W-151-11	21-Oct-91	23
cis-1,2-Dichloroethene	W-151	W-151-11D	21-Oct-91	37
cis-1,2-Dichloroethene	W-153	W-153-01	18-Sep-91	130
cis-1,2-Dichloroethene	W-153	W-153-02	18-Sep-91	120
cis-1,2-Dichloroethene	W-153	W-153-11	23-Oct-91	110
cis-1,2-Dichloroethene	W-153	W-153-11D	23-Oct-91	87
cis-1,2-Dichloroethene	W-153	W-153-12	23-Oct-91	110
cis-1,2-Dichloroethene	W-153	W-153-12D	23-Oct-91	100
cis-1,2-Dichloroethene	W-156	W-156-01	17-Sep-91	170
cis-1,2-Dichloroethene	W-156	W-156-01DL	17-Sep-91	170
cis-1,2-Dichloroethene	W-156	W-156-11	22-Oct-91	170

Table 3.7-2. Upper-Zone Monitor Wells Within the East Parking Lot Plume at Which TCE Degradation Product Concentrations Exceeded CRQLs (Continued, Page 2 of 2)

Chemical Name	Site ID	Sample ID	Sample Date	Result (µg/L)
cis-1,2-Dichloroethene	W-158	W-158-01	14-Sep-91	18
cis-1,2-Dichloroethene	W-158	W-158-11	20-Oct-91	19
cis-1,2-Dichloroethene	W-159	W-159-01	14-Sep-91	20
cis-1,2-Dichloroethene	W-159	W-159-11	20-Oct-91	20
cis-1,2-Dichloroethene	W-160	W-160-01	14-Sep-91	170
cis-1,2-Dichloroethene	W-160	W-160-01DL	14-Sep-91	180
cis-1,2-Dichloroethene	W-160	W-160-11	23-Oct-91	120
cis-1,2-Dichloroethene	W-160	W-160-11D	23-Oct-91	110
cis-1,2-Dichloroethene	WP07-10A	WP07-10A	27-Oct-91	440
trans-1,2-Dichloroethene	HM-099	HM-99	25-Oct-91	2
trans-1,2-Dichloroethene	HM-123	HM-123	25-Oct-91	13
trans-1,2-Dichloroethene	LF04-02	LF04-02	27-Oct-91	15
trans-1,2-Dichloroethene	LF04-04	LF04-04	27-Oct-91	11
trans-1,2-Dichloroethene	LF05-01	LF05-01	28-Oct-91	10
trans-1,2-Dichloroethene	LF05-5A	LF05-5A	27-Oct-91	16
trans-1,2-Dichloroethene	W-150L	W-150L-01	14-Sep-91	22
trans-1,2-Dichloroethene	W-160	W-160-01	14-Sep-91	5
trans-1,2-Dichloroethene	WP07-10A	WP07-10A	27-Oct-91	13
Vinyl Chloride	HM-122	QM-011	19-Mar-91	14
Vinyl Chloride	HM-123	HM-123	25-Oct-91	7
Vinyl Chloride	HM-123	QM-012	19-Mar-91	27
Vinyl Chloride	LF04-02	LF04-02	27-Oct-91	3
Vinyl Chloride	LF04-04	LF04-04	27-Oct-91	3
Vinyl Chloride	LF05-01	LF05-01	28-Oct-91	15
Vinyl Chloride	LF05-5A	LF05-5A	27-Oct-91	7
Vinyl Chloride	W-160	W-160-01	14-Sep-91	98
Vinyl Chloride	W-160	W-160-01DL	14-Sep-91	91
Vinyl Chloride	W-160	W-160-11	23-Oct-91	86
Vinyl Chloride	W-160	W-160-11D	23-Oct-91	78
Vinyl Chloride	WP07-10A	WP07-10A	27-Oct-91	4

Table 3.7-3. Paluxy Formation Monitor Wells at Which TCE was Detected Above the CRQL

Well ID	Sample ID	Sample Date	TCE (µg/L)
P-05M	NAA206	28-Apr-90	14
P-08UN	NAA266	28-Apr-90	22
P-08UN	P-8UN	19-Oct-91	30
P-08US	NAA213	29-Apr-90	550
P-09US	NAA215	29-Apr-90	4,300
P-09US	QM-014	13-Mar-91	980
P-09US	WQM005	05-Dec-90	1,900
P-10M	NAA217	30-Apr-90	13
P-12M	AFR-005	12-Jun-91	3
P-12M	NAA221	29-Apr-90	7
P-14US	NAA225	02-May-90	320
P-15US	NAA226	02-May-90	40
P-16US	NAA228	02-May-90	860
P-16US	P-16US	26-Oct-91	510
P-16US	QM-016	13-Mar-91	780
P-16US	WQM021	09-Dec-90	900
P-22M	NAA275	01-May-90	10
P-22M	P-22M	22-Oct-91	2
P-22M	WQM015	08-Dec-90	7
P-22U	NAA230	01-May-90	90
P-22U	NAA264	01-May-90	69
P-22U	P-22UPPER	27-Jan-90	100
P-22U	WQM017	08-Dec-90	48
P-24M	NAA233	30-Apr-90	8
P-27U	P27U-11	18-Oct-91	69
P-27U	P27U-11D	18-Oct-91	74

EXPLANATION

- ● FIFTH SAMPLING ROUND, OCTOBER 1992
- ○ FOURTH SAMPLING ROUND, JULY 1992
- ▲ THIRD SAMPLING ROUND, APRIL 1992
- △ SECOND SAMPLING ROUND, JANUARY 1992
- □ FIRST SAMPLING ROUND, OCTOBER, 1991
- \+ ANALYSIS REPORTED IN GEOTECH'S OCTOBER, 1990 MONITORING PLAN

HM-119 — WELL NAME
(94) — TCE CONCENTRATION (µg/L)

CONTOUR INTERVAL AND COLOR KEY
µg/L TCE

- +100,000
  10,000–100,000
- 1,000–10,000
- 100–1,000
- 10–100
  1–10

U.S. Air Force Plant 4 and
Carswell Air Force Base
Fort Worth, Texas

Figure 3.7-2
TRICHLOROETHENE CONCENTRATIONS IN UPPER ZONE

SOURCES: JACOBS ENGINEERING GROUP, INC.; ESE.

Detailed summaries of each of these reports are presented in Appendix A. A brief description of the reports, as they pertain to the East Parking Lot plume, is presented in the following paragraphs.

Alternatives for East Plume Groundwater Remediation (Tyndall AFB, 1991)
This report was prepared for Headquarters, USAF by the Air Force Civil Engineering Support Agency, Research Development and Acquisition Directorates. A pump-and-treat alternative was recommended earlier. However, it was not advocated as a final remediation technology but rather as an interim measure to control the further spread of the plume. In this report, applicable and emerging technologies are evaluated for groundwater remediation at the East Parking Lot; the following technologies were considered:

1. Containment technologies,
2. Source removal technologies, and
3. In situ plume management technologies.

Hydraulic and physical containment technologies were considered in this report. The hydraulic containment technology consists of pumping and treating the highly contaminated groundwater immediately downgradient of the source areas. This technology was considered applicable for the remediation of the contaminant plumes at AFP4. The physical containment technology consists of using a sealable joint sheet piling to isolate the source areas. This technology was not considered practical at the site due the presence of underground utilities and the permeable gravel above the Walnut Formation aquifer.

Soil venting and soil washing were the two source removal technologies considered in this report. The soil venting technology was considered applicable at the site. However, the soil washing technology was viewed as too exploratory and risky because the surface tension reduction of TCE by the surfactants can cause a pure TCE phase to migrate further downward.

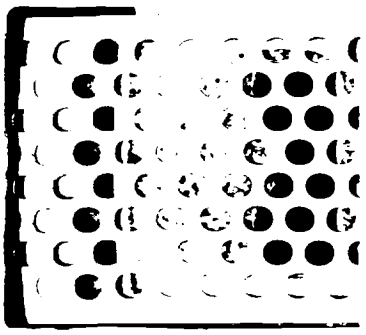
The in situ plume management technologies are still emerging technologies. These include methanotrophic microbial degradation (MMD), constitutive aerobic microbia degradation (CAMD), and the permeable dehalogenation wall (PDW). With the MMD technology, methane and oxygen are dissolved in water and introduced into the aquifer. The microbes co-metabolize the TCE with the methane. The MMD technology was considered innovative and holds promise for application at the site. This technology was in the field demonstration stage at the time of this report and has met with limited success. In the CAMD technology, specific microbes containing enzyme systems, activated by a nontoxic substrate, are added to the groundwater for the destruction of TCE. Field studies are yet to be conducted on this technology.

The PDW technology is applied by emplacing a permeable reaction zone containing iron grindings into the aquifer. This technology is in the field demonstration stage and considered applicable for the upper zone aquifer at the East Parking Lot.

Based on the technology review, interim and long-term recommendations were made for the remediation of the contaminated plume at the East Parking Lot. Also, a cost analysis system, Remedial Action Cost Estimating and Requirements (RACER) system, is proposed for use in the technology evaluation at AFP4.

The following interim and long-term recommendations were made to limit further escalation of the plume:

1. Interim Measures:
    a. Collect data (e.g., concentrations, hydraulic heads, and conductivity) using the existing wells to define the hot-spot dimensions and hydraulic characteristics. Also, additional characterization of the downgradient plume would be needed.



b. Install an extraction well for pilot-scale determine the time series concentratio influence.

c. Complete design and installation of rer downgradient of the hot spots. This w customization of a numerical or analyt pumping situation. Also, an abovegro would be required to treat the contami

d. Install a soil vapor extraction system o Assembly Building and conduct soil sar suspected hot spots.

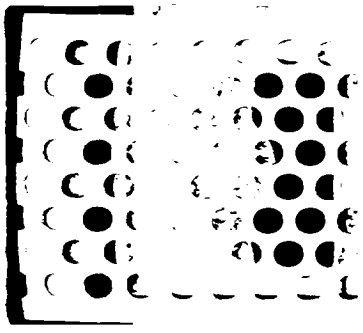
e. Install free-product recovery systems.

Other interim measures suggested to further limit the plu following:

f. Install a soil vapor extraction system n west side of the Assembly Building.

2. Long-term measures:

a. Pump-and-treat for the dilute and pred plume using state-of-the-art pump and processes. Obtain regulatory approval extraction wells at an isoconcentration with a level of risk in the Upper Zone .



b. Consider soil venting operations for lo warranted because of significant vados Alternatively, consider using cometabo

c. Consider other areas of plume manage in situ technologies (soil venting, MMI concentrated portion of the plume.

Draft Contract Quality Control Plan Addendum, Groundwater Remediation of Window Area (IT, 1992)

The Contract Quality Control Plan (CQCP) was prepared as an addendum to the Quality Assurance Management Plan (QAMP). It focused on specific procedures, data quality objectives, and verification activities for the groundwater remediation project at the Window Area. The specific operations addressed in this CQCP include the following:

1. Chemical testing and quality control (QC),
2. Verification of chemical data,
3. Preventive maintenance, and
4. Construction verification and QC.

Chemical Testing and QC--The specific QC requirements for the groundwater chemical analysis samples collected during the aquifer pumping tests are presented in this section. It also specified the requirements for onsite field testing and offsite analytical laboratory QC.

Verification of Chemical Data--A summary of the groundwater chemical data verification requirements is presented along with the required level of review for each activity was also presented in this section.

Preventive Maintenance--The information on the preventive maintenance requirements for the field equipment and the laboratory instruments was discussed. The degree and frequency of maintenance was established according to the frequency of use and the sensitivity of the equipment to environmental conditions.

The schedule of preventive maintenance was presented in the field sampling, analysis, and testing plan (FSATP). A routine preventive maintenance program was conducted by an offsite laboratory team from IT to minimize the occurrence of instrument and system malfunctions.

Construction Verification and QC--The verification inspections and testing activities required for the aquifer pumping test system installation and start-up were discussed. They included the inspection requirements upon receiving the field equipment, inspection of the system installation continually during construction, and the requirements for the pumping test.

Groundwater Remediation of Window Area--50% Design Package (IT, 1993)
This report developed a 50-percent design package for groundwater remediation at the Window Area. It consisted of the specifications and drawings for the air stripping treatment system and the associated equipment.

Final Feasibility Study for AFP4 (RUST Geotech, 1993)
An FS was prepared for the remediation of sites at AFP4. The FS was divided into the following three sections: (1) development and screening of technologies, (2) assembly of screened technologies into alternatives, and (3) evaluation of alternatives.

The applicable remedial technologies for soil and groundwater are identified and screened based on technical implementability and effectiveness. The effectiveness was based on (1) the potential effectiveness of process options in handling the estimated volumes of media and satisfying the identified remedial action objectives, and (2) the proven reliability of the process with respect to the contaminants at AFP4.

The screened technologies were then assembled into alternatives. The following four alternatives were developed for soils at LF01, LF04, and FDTA 2:

1. No action,
2. Containment (capping),
3. Chemical treatment (in situ stabilization), and
4. Removal/disposal.

The following four alternatives were developed for groundwater:

1. No action,
2. Physical treatment (air stripping),
3. Chemical treatment (UV light and oxidation), and
4. Biological treatment (aboveground bioreactors).

The assembled alternatives were then evaluated in detail for the following criteria: (1) overall protection of human health and the environment, (2) compliance with ARARs, (3) long-term effectiveness, (4) reduction of TMV, (5) implementability, (6) short-term effectiveness, (7) cost, (8) state acceptance, and (9) community acceptance. Tables 3.7-4 and 3.7-5 present the comparison of detailed analysis for remediation of groundwater and soils. No final recommendations are made in this FS for the selected alternative.

East Parking Lot, Installation of Groundwater System (IT, 1993)

This report was prepared to inform Lockheed of the construction plans of the groundwater treatment system. This report includes a cover letter and the following schematics of the treatment system: (1) groundwater recovery system details, (2) groundwater recovery system plan, and (3) concrete containment plan and details.

Groundwater Remediation of Window Area--100% Design Package (IT, 1993)

As a result of this project, a 100-percent draft design package was developed for the groundwater treatment facility at the Window Area. The package includes the following:

1. Equipment sizing calculations,
2. Trenching specifications,
3. Concrete specifications,
4. Equipment specifications,
5. Mechanical specifications,
6. Electrical specifications,

Table 3.7-4. Comparative Analysis of Groundwater Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Physical Treatment	Alternative 3 Chemical Treatment	Alternative 4 Biological Treatment
Overall Protectiveness	Contaminants unmitigated, may impact White Settlement production wells in time	Protection of human health and environment through removing metals and dissolved organic contaminants through air stripping	Protection of human health and the environment through removing metals and destroying dissolved organic contaminants through UV/oxidation, respectively	Protection of human health and the environment through destroying dissolved organic contaminants above ground bioreactors
Compliance with ARARs	Would not comply with ARARs	Would comply with ARARs	Would comply with ARARs	Would comply with ARARs
Long-Term Effectiveness and Permanence	No long term effectiveness or permanence	Effective in removing volatiles from the ground water, a permanent solution	Effective in destroying volatiles in the ground water, a permanent solution	Effective in destroying volatiles in the ground water, a permanent solution
Reduction of Toxicity, Mobility, or Volume Through Treatment	Reduction in toxicity and volume over time, no change to mobility	Reduces mobility and volume through ground water well pumping, reduces toxicity through treatment with air stripping	Reduces mobility and volume through ground water well pumping, reduces toxicity by destroying dissolved organic contamination through UV/oxidation.	Reduces mobility and volume through ground water well pumping and destroying dissolved organic contamination through above ground reactors.
Short-Term Effectiveness	Not applicable	Safety requirements for system installation. No expected impacts to workers or nearby communities. Expected project life is 12 years.	Safety requirements for system installation. No expected impacts to workers or nearby communities. Expected project life is 12 years.	Safety requirements for system installation. No expected impacts to workers or nearby communities. Expected project life is 12 years.
Implementability	No action to implement	Straight forward construction and operation. Services, vendors, and technology are readily available. Water quality parameters and updated dissolved contaminants concentrations needed.	Straight forward construction and operation. Services, vendors, and technology available. Water quality parameters and updated dissolved contaminant concentrations required. Pre-treatment of water may be required depending upon water quality. Treatability testing may be required.	Straight forward construction and operation. Services, vendors, and technology available. Water quality parameters and updated dissolved contaminant concentrations required. Pre-treatment of water may be required depending upon water quality. Treatability testing required.
Cost	No cost	$18,250,000	$22,825,000	$23,303,000

Sources: RUST Geotech, 1993; ESE.

Table 3.7-5. Comparative Analysis of Soil Alternatives

Criteria	Alternative 1 No Action	Alternative 2 Containment (Capping)	Alternative 3 Chemical Treatment (Stabilization)	Alternative 4 Removal/Disposal
Overall Protection of Human Health and the Environment	May be protective of Human Health; Protective of Environment	Protective of Human Health; Protective of Environment	Protective of Human Health; Protective of Environment	Protective of Human Health; Protective of Environment
Compliance with ARARs	Would Comply with ARARs	Would Comply with ARARs	Would Comply with ARARs	Would Comply with ARARs
Long-Term Effectiveness and Permanence	No changes in BRA condition expected	Long-term risks reduced, periodic maintenance required.	Long-term risk reduced. No maintenance required.	Long-term, risks reduced at Plant 4. No maintenance necessary. Long-term liabilities at final disposal site may exist.
Reduction of Toxicity, Mobility, or Volume Through Treatment	No reductions in toxicity, mobility, or volume	Mobility reduced. No change in toxicity or volume.	Mobility reduced. Toxicity probably not reduced. Slight increase in volume.	Mobility reduced. Toxicity and volume removed from Plant 4 but still exists at disposal site.
Short-Term Effectiveness	No short-term risks	Small risk expected during construction activities. Small risk of wetlands impact.	Some risks during construction, probably greater risk than Alternatives 2 and 4 due to types of equipment utilized. Small risk of wetlands impact.	Small risk expected during construction activities. Small risk of wetlands impact. Transportation related risks.
Implementability	May be difficult to obtain acceptance of no-action	Easy to implement	Treatability testing required. Administrative issues to be resolved. Services available, although not as available as those for Alternative 2.	Transportation issues to be resolved. Services available, although not as available as those for Alternative 2.
Cost	No Cost	$266,000	$15,000,000	$40,000,000

Sources: RUST Geotech, 1993; ESE.

7. Equipment shop drawings, and
8. Construction drawings.

3.7.2 REMEDIATION PROJECT OBJECTIVES

The remediation objective of this project is to extract TCE-contaminated groundwater from the shallow zone, using eight groundwater extraction wells, and treat with air stripping and carbon adsorption. The system also has the objective of preventing the transmission of groundwater from the upper aquifer to the Paluxy aquifer. A low profile air stripper was installed inside the assembly building to treat water which seeps through a pit wall.

3.7.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

As of January 3, 1993, the Window Area groundwater system was under construction. The locations of groundwater extraction wells are depicted in Figure 3.7-3.

The air stripper located inside the Assembly Building is referred to as the Taper Edge Treatment System. The system is located near a pit which was used for dipping large parts. The pit was excavated to bedrock. Due to cracks present in the walls of the pit, groundwater seepage has been penetrating the pit wall. In April 1992, a low profile air stripper was installed at the site to treat water that was pumped from the pit. The system initially used a vapor-phase carbon adsorption system for air stripper emissions. However, this emission control system was determined to be unnecessary. To date, the Taper Edge Treatment System has treated approximately 1,240,000 gal of water.

3.7.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

In 1991, Tyndall AFB developed remediation alternatives for the treatment of contaminated groundwater at the East Parking Lot. IT developed a CQCP in 1992 and a 50-percent design package in 1993 for the Window Area groundwater remediation. An FS was developed for the remediation of sites at

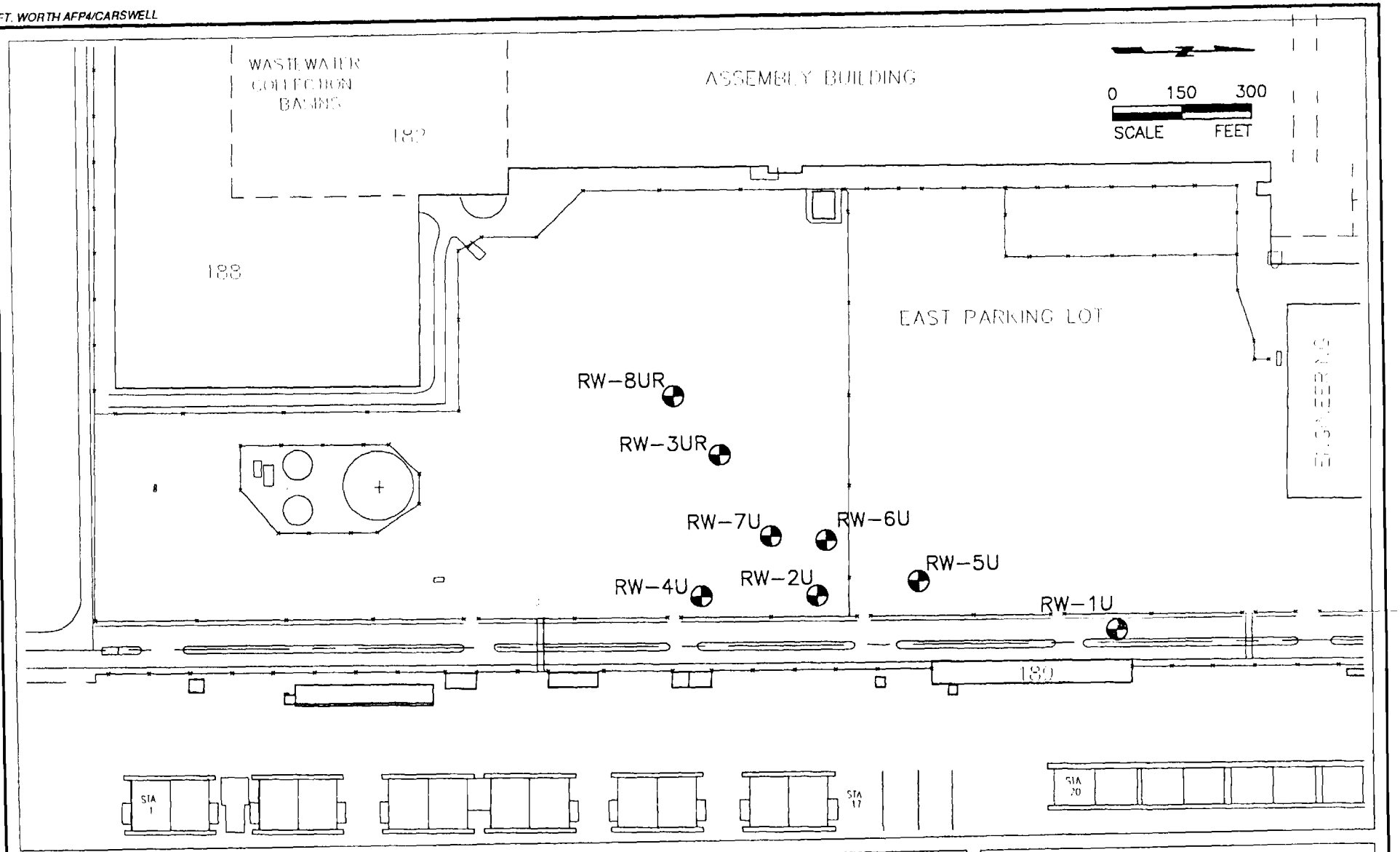


Figure 3.7-3
EAST PARKING LOT RECOVERY WELLS PLANT NO. 4
CARSWELL AIR FORCE BASE FORT WORTH, TEXAS

SOURCE: ESE.

Environmental Science & Engineering, Inc.

AFP4, including the East Parking Lot Plume (RUST Geotech, 1993). The 100-percent design package was then published in September 1993.

No data are available for the Taper Edge Treatment System.

3.7.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

Recommendations for additional studies and/or remediation were not made in the file reports. However, in a conversation with Mr. Victor Dozzi, project manager for the construction contractor (IT) additional wells may need to be installed on the east side of the road, although this recommendation can not be finalized until the system has started up (IT, 1994). An underground walkway beneath the road may facilitate the installation of utilities to expand the system to the east side of the road.

3.7.6 PROJECTS RESULTING FROM THE PROJECT

No projects were identified to result from this project, based on review of the file material.

3.7.7 PROJECT STATUS

The Window Area remediation project is currently under construction. Wells and underground piping are in place. The concrete work has been completed. The electrical work is scheduled to start the week of January 10, 1994. Water from extraction wells will be pumped to an equalization basin, then through a bag filter system prior to treatment in an air stripper and carbon adsorber. Offgases from the air stripper will be passed through vapor-phase carbon prior to discharging to the atmosphere. Treated water will be discharged to the Lockheed wastewater treatment system (IT, 1994).

Information pertaining to the status of the Taper Edge Treatment System was not available.

3.7.8 SCHEDULE

The Window Area groundwater remediation system is scheduled for start-up. Schedule information pertaining to the Taper Edge Treatment System was not available.

3.7.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.7.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

Figure 4-2 of the December 1992 MAP projects that the IRA for this site will start in July 1995. Table 4-1 of this same report projects an IRA startup date of March 1993.

3.8 BUILDING 181

In 1991, operators of the chemical process area in Building 181 noted that unusually large quantities of TCE were required to refill one of two degreaser tanks located within the building. Later, TCE was observed leaking from the tank. In 1991, both degreaser tanks were removed from the building. Past spills of TCE have reportedly occurred within the Chemical Process Facility of the Assembly Building/Parts Plant. Trenches, sumps, floor drains, and buried pipelines are also present throughout the manufacturing facility. These are all potential source areas for soil contamination resulting from spills and leaks. Widespread TCE contamination in the groundwater was identified by previous investigators in the area east of the Assembly Building/Parts Plant. Building 181 is thought to be a contributor to this contamination. The location of the building is depicted in Figure 3.7-2. A pilot study involving the investigation of soil vacuum extraction is currently being conducted at this site.

3.8.1 SUMMARY OF REPORTS FOR BUILDING 181

Three reports were considered to contain information pertinent to the Task 2 objectives:

1. Soil and Groundwater Assessment, Building 181, U.S. Air Force Plant No. 4 (Hargis & Associates, Inc., 1992);
2. Soil Vapor Extraction Pilot Plant Installation Description, AFP4, Building 181 (ESE, 1993a); and
3. Soil Vapor Extraction Pilot Plant Operation and Maintenance, Sampling, and Test Manual, AFP4, Building 181 (ESE, 1993b).

Detailed summaries of each of these reports are presented in Appendix A. The following paragraphs are a brief description of the reports, as they pertain to Building 181.

Soil and Groundwater Assessment, Building 181, U.S. Air Force Plant No. 4 (Hargis & Associates, Inc., 1992)

In 1992, an assessment of the chemical quality of soil and groundwater at Building 181 was completed. The chemical analysis of the soils (Table 3.8-1) and groundwater (Table 3.8-2) indicated that TCE was present in both soils [maximum 1,100 milligrams per kilogram (mg/kg)] and groundwater [maximum 1,100 milligrams per liter (mg/L)].

A treatability study was conducted to evaluate the performance of a vapor extraction system for the remediation of soils and groundwater at Building 181. Based on the treatability study results, recommendations were made for a remedial action plan to be implemented at the site using a vapor extraction system.

Soil Vapor Extraction Pilot Plant Installation Description, AFP4, Building 181 (ESE, 1993a)

This report references a pilot-scale soil remediation effort was initiated at Building 181 for the cleanup of contaminated soils by vapor extraction technique. A plan was made for the installation and operation of a soil vapor extraction pilot plant (SVEPP).

Table 3.8-1. Summary of Trichloroethene Concentrations Detected in Soil Samples

SOIL BORING	SOIL SAMPLE IDENTIFIER	SAMPLE DATE	SAMPLE DEPTH (feet bls)	TCE CONCENTRATION (mg/kg)
MW-4	MW-4-1.0	02/24/92	1.0	200
MW-4	MW-4-10.0	02/24/92	10.0	46
MW-4	MW-4-20.0	02/25/92	20.0	49
MW-5	MW-5-1.0	02/26/92	1.0	4.7
MW-5	MW-5-10.0	02/26/92	10.0	30
MW-6	MW-6-1.0	02/27/92	1.0	0.041
MW-6	MW-6-10.0	02/27/92	10.0	31
MW-6	MW-6-15.0	02/27/92	15.0	41
MW-6	MW-6-30.0(a)	02/27/92	30.0	0.020
MW-7	MW-7-1.0	02/29/92	1.0	<0.005
MW-7	MW-7-10.0	02/29/92	10.0	<0.005
MW-7	MW-7-20.0	02/29/92	20.0	<0.005
VW-2	VW-2	02/25/92	0.0 - 4.0	1,100

(a) Saturated sample, not used for interpretation of soil sample analytical data

TCE = Trichloroethene
bls = Below land surface
mg/kg = Milligrams per kilogram

Table 3.8-2. Analytical Results for Volatile Organic Compounds Detected in Groundwater Samples Collected From Perched Zone Monitor Wells

COMPOUNDS (milligrams per liter)	Well ID and Sampling Date: VW-1 03/12/92	VW-2 03/12/92	VW-3 03/12/92	VW-4 03/12/92
Acetone	<100	<100	<100	<100
Acrolein	<500	<500	<500	<500
Acrylonitrile	<500	<500	<500	<500
Benzene	<10	<10	<10	<10
Bromodichloromethane	<10	<10	<10	<10
Bromoform	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10
Carbon Tetrachloride	<10	<10	<10	<10
Chlorobenzene	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10
2-Chloroethylvinyl ether	<10	<10	<10	<10
Chloroform	<10	<10	<10	<10
Chloromethane	<10	<10	<10	<10
Dibromochloromethane	<10	<10	<10	<10
1,2-Dichlorobenzene	<10	<10	<10	<10
1,3-Dichlorobenzene	<10	<10	<10	<10
1,4-Dichlorobenzene	<10	<10	<10	<10
1,1-Dichloroethane	<10	<10	<10	<10
1,2-Dichloroethane	<10	<10	<10	<10
cis 1,2-Dichloroethene	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10
Trans-1,2-Dichloroethene	<10	<10	<10	<10
1,2-Dichloropropane	<10	<10	<10	<10
cis-1,3-Dichloropropylene	<10	<10	<10	<10
trans-1,3-Dichloropropene	<10	<10	<10	<10
Ethylbenzene	<10	<10	<10	<10
Freon 113	<10	<10	<10	<10
2-Hexanone	<50	<50	<50	<50
Methylene Chloride	<10	<10	<10	<10
Methyl Ethyl Ketone	<50	56	<50	<50
Methyl Isobutyl Ketone	<50	<50	<50	<50
Styrene	<10	<10	<10	<10
1,1,2,2-Tetrachloroethane	<10	<10	<10	<10
Tetrachloroethylene	<10	<10	<10	<10
1,1,1-Trichloroethane	<10	<10	<10	<10
1,1,2-Trichloroethane	<10	<10	<10	<10
Trichloroethene	900	1,000	850	1,100
Toluene	<10	<10	<10	<10
Trichlorofluoromethane	<10	<10	<10	<10
Total Xylenes	<10	<10	<10	<10
Vinyl Acetate	<100	<100	<100	<100
Vinyl Chloride	<10	<10	<10	<10
QUALITY ASSURANCE CODE	ORG	ORG	ORG	ORG
EPA Method Number	8240	8240	8240	8240

(<) = Less than; numerical value is the Limit of Detection for that compound
ORG = Original sample
EPA = U.S. Environmental Protection Agency

This report presented the soil vapor extraction process description and the plan for the installation and operation of SVEPP. The process flow schematic is depicted in Figure 3.8-1. The locations of the pilot system extraction wells are depicted in Figure 3.8-2.

Soil Vapor Extraction Pilot Plant Operation and Maintenance, Sampling, and Test Manual, AFP4, Building 181 (ESE, 1993b)

This report presented the O&M requirements for SVEPP. A description of vapor extraction technology, SVEPP objectives, overview of SVEPP tests and data evaluation were presented.

3.8.2 REMEDIATION PROJECT OBJECTIVES

The current remediation project being conducted at Building 181 is a pilot study. The objectives for conducting the 90-day vapor extraction pilot study on TCE-contaminated soils of the perched and upper zones underlying Building 181 are to:

1. Remove as much contaminant from the subsurface soils, particularly in the perched zone, as possible during the pilot study;
2. Develop the following pilot test parameters which are necessary to evaluate the applicability of vapor extraction and allow for design of a full-scale soil vapor extraction remedial system:
   a. The radius of influence (R_1) for varying vacuums and flowrates,
   b. The soil's permeability to airflow (k), and
   c. Contaminant removal rates (m).
3. Determine if vapor extraction of upper-zone soils is effective, implementable, and cost efficient.

ESE is also investigating other characteristics, such as vacuum distribution, subsurface channeling and obstructions, contaminant mobility, and air flow pathways, all of which must be considered when properly designing a vapor

CARSCHEM

180108

SP–CARB2
SP–OFFGAS
SP–CARB1
VES CONTROL PANEL
3000lb VAPOR PHASE G.A.C.
3000lb VAPOR PHASE G.A.C.
SP–BAIV
BLEED AIR INLET VALVE
CYCLONIC SEPARATOR
MANIFOLD SAMPLE PORTS
SP–TOTAL
INFLUENT CONTROL VALVE
110 GAL CONDENSATE TANK
F1
F2
F3
P1
BLOWER OFFGAS
TRANSFER PUMP #1
VENT
1000 GAL HOLDING TANK
DISCHARGE VIA VACUUM TRUCK

SPV–1 SPV–2 SPV–3 SPV–4 SPV–5 SPV–6 SPV–7 SPM–1

PZ–1 PZ–2 PZ–3 PZ–4 PZ–5 PZ–6 PZ–7

UZ–1 (MW–1)

CHECK VALVE
FLOW INDICATOR
TEMPERATURE
PRESSURE (MAGNEHELIC)
BLOWER
BALL VALVE
PUMP
GATE VALVE
SAMPLE PORT

F1 EMERGENCY HIGH FLOAT SWITCH (SYSTEM SHUTDOWN)
F2 LOW LEVEL FLOAT SWITCH (STOP PUMP)
F3 HIGH LEVEL FLOAT SWITCH (START PUMP)
P1 HIGH PRESSURE (SYSTEM SHUT DOWN)
GLOBE VALVE
VACUUM RELIEF
TOTALIZING FLOW METER

Figure 3.8–1
PROCESS FLOW SCHEMATIC
AIR FORCE PLANT NO.4
FORT WORTH, TEXAS

SOURCE: ESE

Environmental Science & Engineering, Inc.

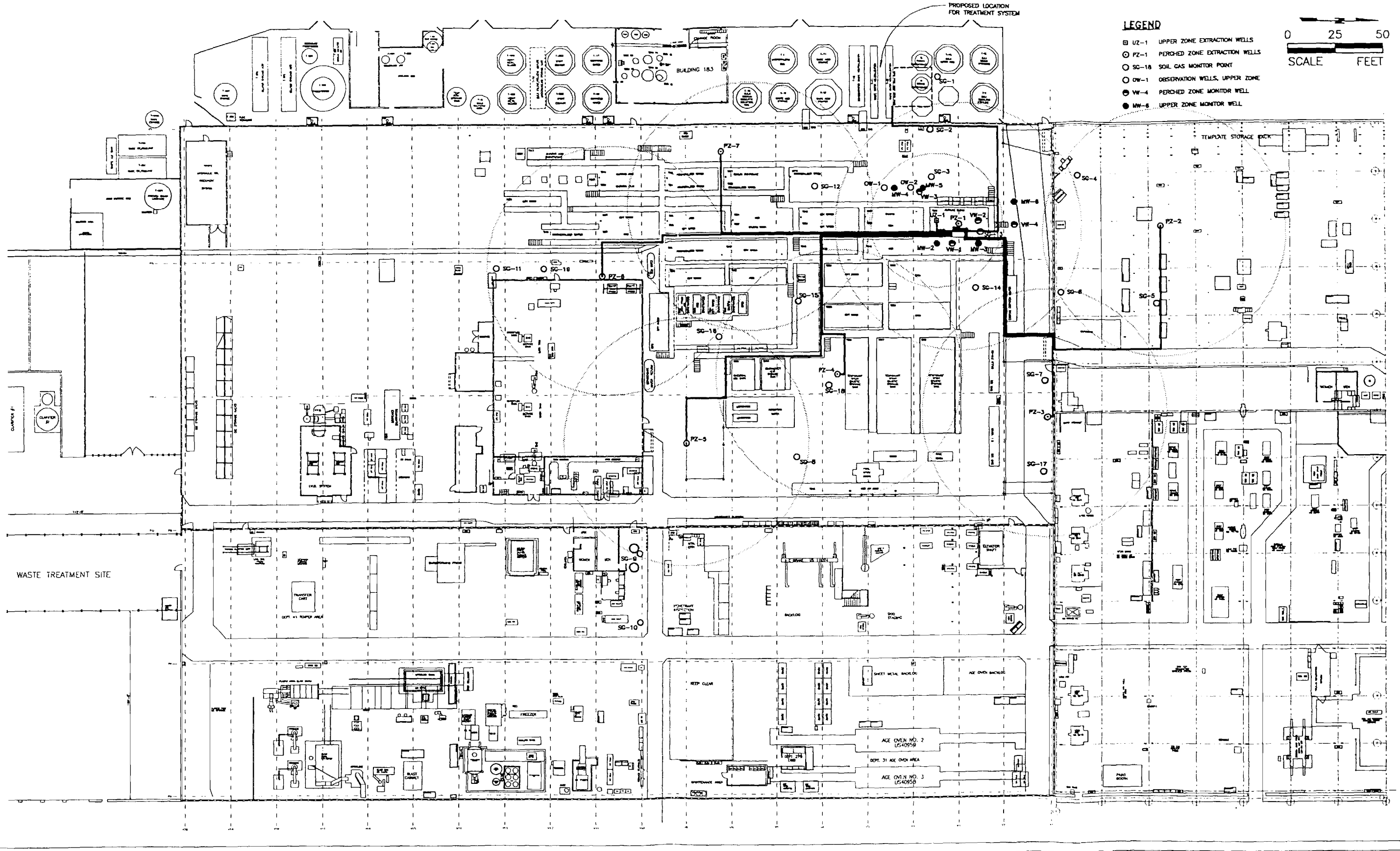


Figure 3.8-2
LOCATION OF THE PILOT SYSTEM EXTRACTION WELLS

SOURCE: ESE

Environmental Science & Engineering, Inc.
A CILCORP Company

extraction system. Finally, operation of the SVEPP system will allow an accurate assessment of O&M costs associated with continued operation of the pilot-scale system or operation of a full-scale system (ESE, 1994).

3.8.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Seven perched zone wells [screened from 1.0 to approximately 4.0 feet below land surface (ft-bls)] were specified and installed for vapor extraction from the perched zone. The location of each perched zone well was based on information presented in the short-term treatability study (Hargis & Associates, Inc., 1992), which was used to derive the estimated radius of influence (R_I), flowrate, and vacuum achievable.

A network of 19 permanently installed soil gas probes (SG-1 through SG-19) is being used to observe vacuum propagation in the perched zone. In addition to monitoring vacuum propagation, the soil gas probes are being used to observe the effectiveness of SVEPP remediation by monitoring soil gas concentrations during the 90-day SVEPP test. Soil gas concentrations are monitored by shutting down the SVEPP system, allowing the soil gas concentrations to equilibrate, and measuring the soil gas concentrations at each soil gas probe.

Vapor extraction of the upper zone is considered to be secondary in importance to vapor extraction of the perched zone because of the following:

1. The short-term treatability study results show poor vapor propagation in the upper zone, primarily due to the clayey nature of the upper zone soils and weathered limestone of the Goodland Limestone formation.
2. The observed vacuum responses in MW-2 and MW-3 during the treatability study may indicate channelization within the upper zone because MW-4 and MW-5 (both within the predicted 35 ft R_I) demonstrated no vacuum response.

3. An extremely low flowrate (1 cfm) was encountered during the treatability study. A higher flowrate would be expected for radial flow path propagation over a 35 ft R_I.
4. Clayey soils are difficult to remediate by vapor extraction.
5. Additional information is required to design a pilot- or full-scale vapor extraction system for the upper zone.

Additional information, obtained during operation of the SVEPP system, will be useful in evaluating the effectiveness and implementability of vapor extraction of the upper zone soils. One upper-zone well (UZ-1--existing MW-1, screened from 11 to 25 ft-bls) will be used for vapor extraction from the upper zone.

The SVEPP system consists of a Roots positive displacement blower, model 47 Universal RAI with a 7.5-horsepower (hp) motor. A cyclonic condensate separator and condensate tank provide condensate removal from the air stream. Two 3,000-lb vapor-phase carbon vessels have been installed for offgas treatment for the removal of contaminants from the air stream prior to discharge to the atmosphere.

Installation of the SVEPP extraction wells, extraction well piping, soil gas probes, piping manifold, SVEPP equipment, and carbon vessels was initiated on October 18, 1993, and completed on November 4, 1993. System proving and step testing of the extraction wells was conducted from November 4 to 8, 1993.

3.8.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data from the pilot study are currently available.

3.8.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

Additional information, obtained during operation of the SVEPP system, will be useful in evaluating the effectiveness and implementability of vapor extraction of

the upper zone soils. One upper-zone well (UZ-1--existing MW-1, screened from 11 to 25 ft-bls) will be used for vapor extraction from the upper zone.

3.8.6 PROJECTS RESULTING FROM THE PROJECT

None were identified.

3.8.7 PROJECT STATUS

The SVEPP system was started on December 2, 1993. A total flowrate of approximately 200 cfm was achieved from all extraction wells. The vacuum applied to each well head is approximately 2.0 inches mercury. Carbon breakthrough of the first 3,000-lb vessel was noted on December 6, 1993 (4 days after system startup). After carbon change out on December 9, 1993, the SVEPP was restarted. Breakthrough of the second 3,000-lb vessel was noted on December 15, 1993. Based on daily photoionization detector (PID) analysis of the offgas from the system, ESE estimates approximately 800 lb of TCE were removed during the 12 days from December 2 to December 15, 1993. Due to low ambient temperatures, condensation of water and product in the vessels has affected the efficiency of the removal process. Winterization of the SVEPP system has been implemented to optimize removal efficiencies. Winterization included insulation of the carbon vessels, carbon vessel manifold and piping, and blower discharge piping. In addition, the carbon vessel manifold piping has been heat traced. The SVEPP system was returned to operation on January 7, 1994 (ESE, 1994).

3.8.8 SCHEDULE

The schedule requires operation of the SVEPP system for a 90-day period. The 90-day period is expected to be complete by approximately April 1, 1994. A draft pilot study report is due to the USAED, Fort Worth, 14 days later.

3.8.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.8.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

No discrepancies were identified during the review of file material for Building 181.

3.9 USTs

Prior to 1988, 14 USTs were removed from AFP4. Twelve of these contained petroleum products and two contained hazardous substances (Hargis & Associates, Inc., 1989a). Following removal of USTs, analyses of soil samples collected from the excavations indicated that six of the UST locations (USTs 19, 20, 24A, 24B, 25A, and 30) have contaminants. After removal of USTs, the excavations were backfilled and paved; however, no further remedial action was performed.

3.9.1 SUMMARY OF REPORTS FOR USTs

Two reports were considered to contain information pertinent to the Task 2 objectives:

1. MAP for AFP4, 1992, and
2. Draft-Final FS for AFP4 (RUST Geotech, 1993).

Detailed summaries of each of these reports are presented in Appendix A. A brief description of the reports, as they pertain to the USTs, is presented in the following paragraphs.

MAP 1992

This report states that 51 USTs have been tested, investigated, and/or mitigated at AFP4. A total of 17 was noted to be in use; 15 were to be addressed with an existing contract; and 19 were removed or abandoned in place.

Final FS for AFP4 (RUST Geotech, 1993)

This report gives the status of several USTs at AFP4.

USTs 19 and 20--The former locations of USTs 19 and 20 are shown in Figure 3.9-1. These USTs (12,000-gal capacity each) were reported to contain 2-butanone (UST 19) and xylene (UST 20). During excavation, contaminants detected in soil included 2-butanone, xylene, and ethylbenzene.

During a 1992 investigation, further sampling was conducted for VOCs, SVOCs, and priority pollutant metals at the site. VOCs, including total petroleum hydrocarbons (TPH) (maximum 8,781 mg/kg), 2-butanone (1,800 mg/kg), toluene (12,000 mg/kg), chloroform (1,900 mg/kg), and bromodichloromethane (600 mg/kg) were detected in significant concentrations.

SVOCs, including 2-methylnaphthalene (50 mg/kg) and benzofluranthene (11 mg/kg) were detected in significant concentrations. No priority pollutant metals were detected in significant concentrations. It was estimated that approximately 240 yd^3 of soil was contaminated at the site.

USTs 24A and 24B--The former locations of the USTs 24A and 24B are shown in Figure 3.9-2. These USTs (8,000-gal capacity each) were reported to contain gasoline. Contaminants detected in soil during excavation included 1,1,1,1-tetrachloroethene [8 micrograms per kilogram (μg/kg)]; trans-1,2-dichloroethene (15 μg/kg); tetrachloroethene (270 μg/kg); ethylbenzene (11 μg/kg); methylene chloride (11 μg/kg); toluene (67 μg/kg); trichloroethene (8 μg/kg); and total xylenes (160 μg/kg) (Hargis & Associates, Inc., 1989a).

During a 1992 investigation, further sampling was conducted at the site. TPH were detected (maximum 76 mg/kg) and were considered to be the only significant contaminant present at the site. It was estimated that approximately 240 yd^3 of soil were contaminated at the site.

UST 25A--The former location of UST 25A is shown in Figure 3.9-3. The UST was reported to contain fuel hydrocarbons. Contaminants detected in soil during

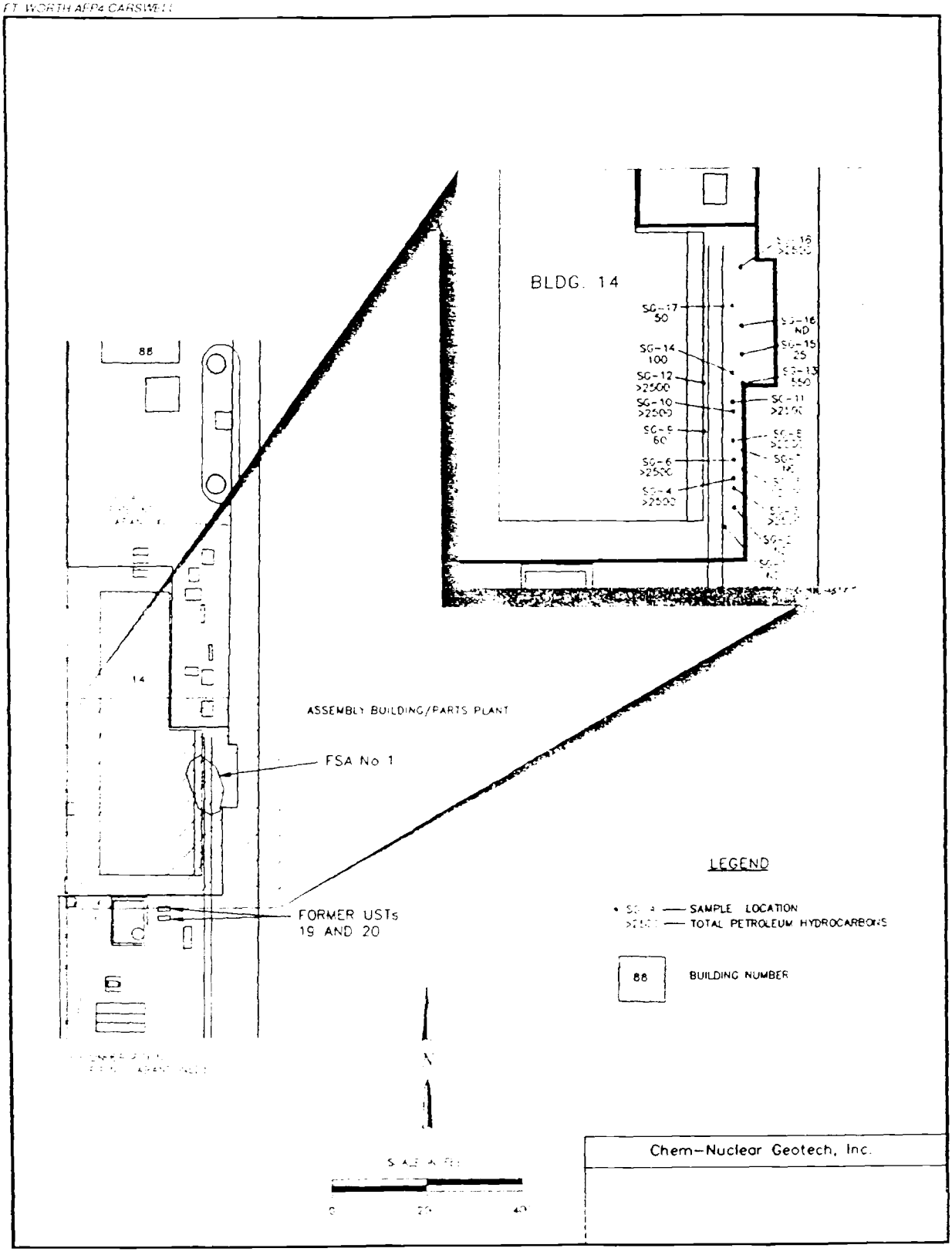


Figure 3.9-1 LOCATION OF USTS 19 AND 20 (REMOVED)

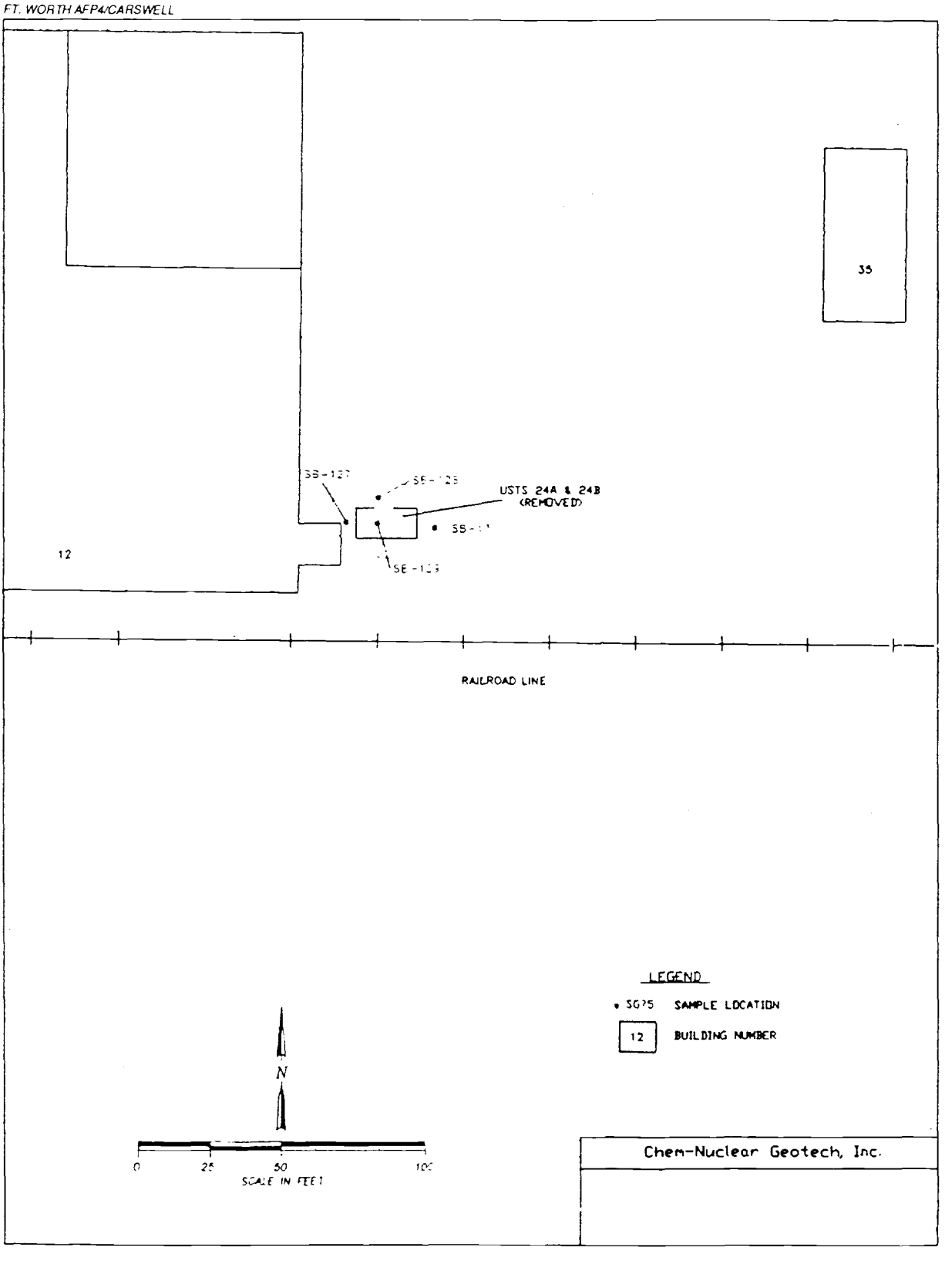


Figure 3.9-2 LOCATION OF USTs 24A AND 24B (REMOVED)

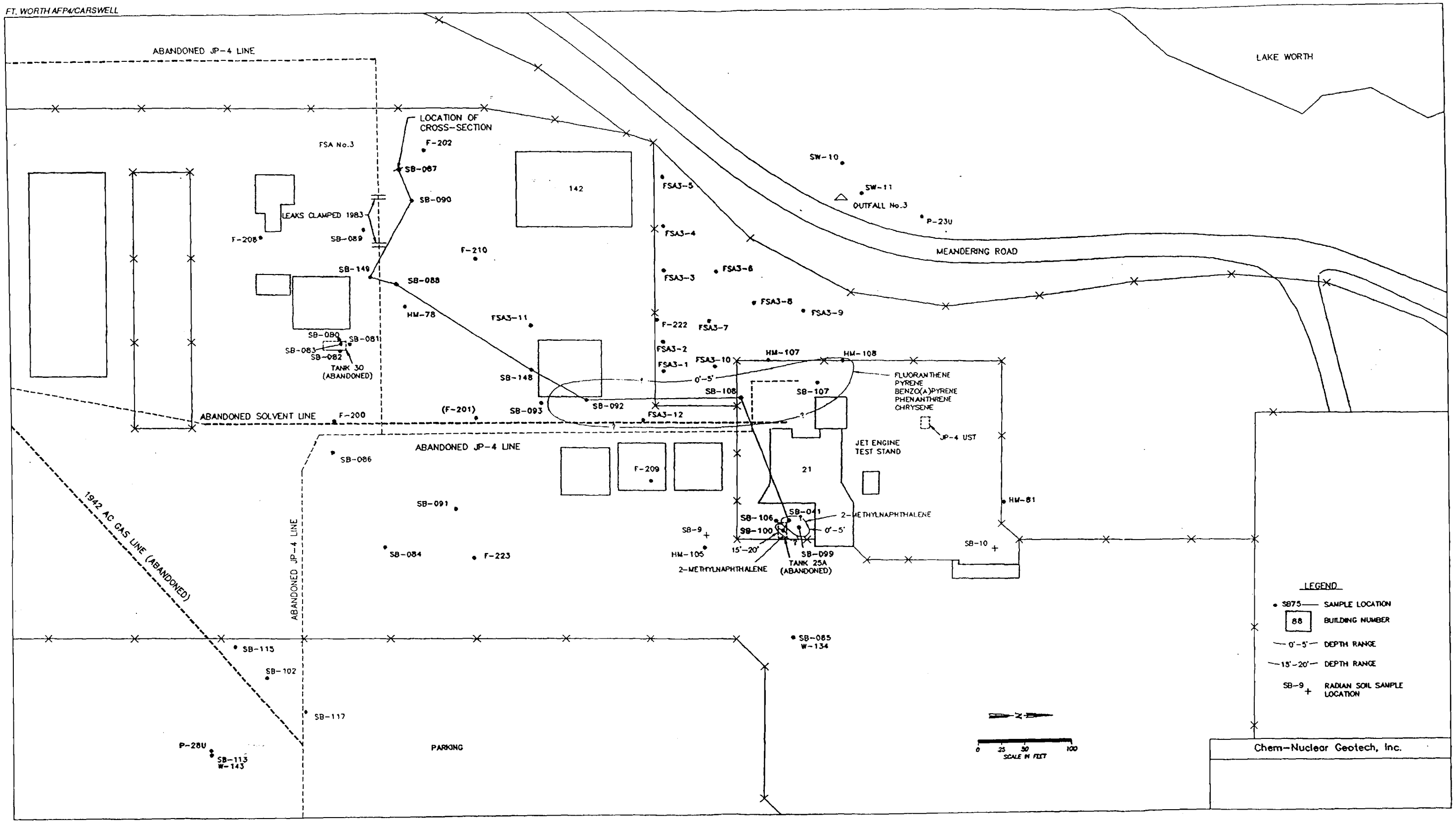


Figure 3.9-3 LOCATION OF USTs 25A AND 30 (REMOVED)

excavation included benzene, toluene, and xylene. The concentration of hydrocarbon fuels was reported at 1,700 mg/kg.

During a 1992 investigation, further sampling was conducted for VOCs, SVOCs, and priority pollutant metals at the site. TPH (maximum 975 mg/kg), fluroethane (5.1 mg/kg), phenanthrene (5 mg/kg), and chromium (180 mg/kg) were detected in significant concentrations.

UST 30--The former location of UST 30 is also shown in Figure 3.9-3. The UST was reported to contain fuel hydrocarbons. Contaminants detected in soil during excavation included benzene, toluene, ethylbenzene, and xylene (BTEX).

During a 1992 investigation, further sampling was conducted for VOCs, SVOCs, and priority pollutant metals at the site. The compounds 2-methylnaphthalene (maximum 5,900 μg/kg) and naphthalene (maximum 2,700 μg/kg) were detected in significant concentrations.

3.9.2 REMEDIATION PROJECT OBJECTIVES

The objective of the completed remedial activities was to remove USTs 19, 20, 24a, 24b, 25a, and 30. The objective of the remedial actions required to remove the contaminated soils was not specified in the file material. The remedial actions for the UST sites are governed by the Texas UST Program.

3.9.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

USTs 19, 20, 24a, 24b, 25a, and 30 were removed in December 1988. The accomplishments/results of the remedial actions pertaining to contaminated soils at these sites is not documented in the file material.

3.9.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data/information developed for the referenced sites were identified during the records review.

3.9.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

No recommendations for additional studies for the referenced sites were identified during the records review.

3.9.6 PROJECTS RESULTING FROM THE PROJECT

No projects resulting from this project were identified during the records review.

3.9.7 PROJECT STATUS

The removal of the USTs was completed in December 1988. The status of the removal of contaminated soils from the UST sites is not documented in the file material.

3.9.8 SCHEDULE

The removal of the USTs was completed in December 1988. The schedule of the removal of contaminated soils from the UST sites is not documented in the file material.

3.9.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project is in IRPIMS.

3.9.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

No discrepancies were observed.

3.10 LF04 AND LF05

LF04 and LF05 are two separate sites located on CAFB, as depicted in Figures 3.10-1. The following paragraphs provide a brief summary for each site.

LF04 (SWMU No. 22)

LF04 consists of 10 acres of land located east of the runway and is currently the location of the radar site. The site was used as a landfill from 1956 to 1975.

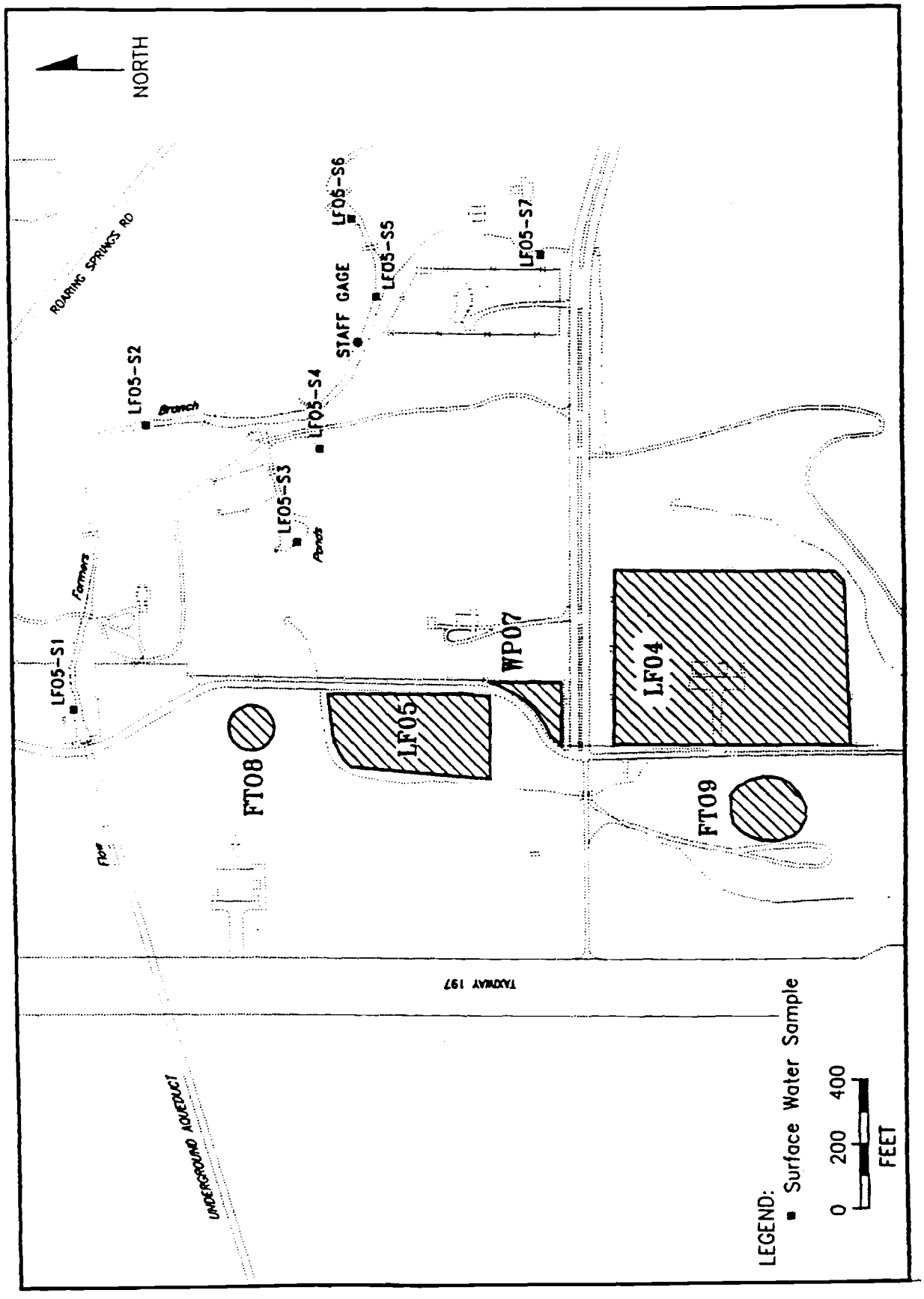


Figure 3.10-1 Location of Surface Water Sampling Points, Flightline Area, Carswell AFB, Texas (Spring, 1990)

SOURCES: Radian, 1991; ESE.

Various materials suspected of being hazardous (waste paints, thinners, and strippers) were reportedly disposed of at the site. Soil and groundwater samples were collected and analyzed for metals, VOCs, and SVOCs.

The soil samples indicated that only silver (1.9 mg/kg) was present in two borings. In Round 1 groundwater sampling, lead, chromium, barium, and cadmium exceeded the MCLs. TCE was detected (4,200 μg/L); benzene exceeded maximum contaminant levels (MCLs) in Round 1 but was not detected in the Round 2 sampling effort.

USACE identified a TCE plume in the upper-zone groundwater during Round 2 sampling in the area of SWMUs 22, 23 (LF05), and 24 (Waste Burial Area). Further investigation was proposed to determine the extent of groundwater contamination at this site. USACE later submitted a preliminary RAP, which recommended installation of a slurry wall, multimedia cap, and a groundwater treatment system.

LF05 (SWMU No. 23)

LF05 was used as a landfill and reportedly received all types of flightline wastes and refuse that were regularly burned prior to covering. Silver (1.8 mg/kg), arsenic (13 mg/kg), TCE (22 μg/kg), toluene (31 μg/kg), and phthalates (maximum 800 μg/kg) were detected in the soil samples. TCE (maximum 3,800 μg/L); 1,1,1-trichloroethane (67 μg/L); vinyl chloride; and trans-1,2-dichloroethene were detected in the groundwater samples. USACE later submitted a preliminary RAP, which recommended installation of a slurry wall, multimedia cap, and a groundwater treatment system.

A groundwater pump and treat system has been installed to remediate contaminated groundwater at LF04 and LF05.

3.10.1 SUMMARY OF REPORTS FOR LF04 AND LF05

The following five reports were considered to contain information pertinent to the Task 2 objectives:

1. Summary of Permit Sites (USACE, 1991);
2. Preliminary Remedial Action Plans--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE, 1991);
3. Final Feasibility Study for the Flightline Area (Radian, 1991);
4. MAP, 1993; and
5. POTW Discharge Permit (IT, 1993).

Detailed summaries of each of these reports, as they pertain to LF04 and LF05, are presented in Appendix B. The following is a brief description of the reports.

Summary of Permit Sites (USACE, 1991)

This report summarized information of sites located at CAFB. The summary includes history, investigations, findings, and recommendations.

Preliminary Remedial Action Plans--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE, 1991)

This report addresses SWMUs 22, 23, and 24, which were proposed for consideration as a combined site in dealing with the problem of TCE in groundwater. Additional sampling was proposed in the area to determine the extent of groundwater contamination.

Installing a slurry wall to prevent the migration of contamination, placing a multimedia cap to prevent infiltration, and treating the groundwater by air stripping were recommended as remedial actions at the site.

Final Feasibility Study for the Flightline Area (Radian, 1991)

This FS was prepared for the Flightline Area sites LF04, LF05, and WP07. The report was divided into the following three sections: (1) screening of remedial

technologies, (2) development of remedial alternatives, and (3) detailed evaluation of alternatives.

In Section 1.0, technologies were screened for (1) performance and effectiveness, (2) constructibility and implementability, and (3) cost. Then the potentially applicable technologies were combined into seven remedial alternatives (Table 3.10-1) that were developed and screened against the broad criteria of effectiveness, implementability, and cost. The alternatives were later evaluated in detail based on the following criteria:

1. Overall protection of human health and the environment,
2. Compliance with ARARs,
3. Long-term effectiveness and permanence,
4. Reduction of TMV,
5. Short-term effectiveness,
6. Implementability, and
7. Cost.

The comparative evaluation matrix for the seven alternatives is presented in Table 3.10-2. Based on this evaluation, Alternative 4B (air stripping and disposal of effluent to a POTW sewerline) was selected as the preferred alternative for the groundwater remediation at the Flightline Area.

MAP, 1993

The MAP reported that the remediation design for LF04 and LF05 was cancelled in December 1991.

POTW Discharge Permit (IT, 1993)

The purpose of this permit was to request permission from the City of Fort Worth to discharge retreated groundwater from the groundwater treatment system at LF04 and LF05 to the POTW.

Table 3.10-1 PRELIMINARY REMEDIAL ACTION ALTERNATIVES

	Alternatives											
	1	2A	2B	3A	3B	4A	4B	5A	5B	6A	6B	7*
Waste Containment Cap Existing Landfills	NA	■	■	■	■					■	■	
Slurry Wall Placed Around Perimeter of Landfill	NA	■	■					■	■			
Ground-Water Extraction Wells Placed on Perimeter of Landfill	NA			■	■	■	■					
Ground Water Monitoring	NA	■	■	■	■	■	■	■	■	■	■	■
Extraction Well System	NA	■	■	■	■	■	■	■	■	■	■	■
On-Site Air Stripping	NA	■	■	■	■	■	■	■	■	■	■	
Disposal Discharge Treated Effluent into Farmers Branch Creek	NA	■		■		■		■		■		
Discharge Treated Effluent into POTW	NA		■		■		■		■		■	
Seasonal Irrigation of Base Golf Course	NA	■	■	■	■	■	■	■	■	■	■	■

NA - No Action

*Alternative 7 utilizes any of the waste containment options listed in Alternatives 2, 3, 4, 5, or 6.

SOURCES: Radian, 1991; ESE.

Table 3.10-2 RESULTS OF REMEDIAL ALTERNATIVES COMPARATIVE EVALUATION

Primary Alternatives	Capital ($ M)	O&M ($ M)	NPV ($ M)	Technology Status	Compliance with ARARs	Constructability	Off-Site Impacts	Need for Further Study	Impacts to Base Operation	Products Generated	Reliability	Regulatory Acceptance	Permitting Requirements	Effectiveness Total	Effectiveness Total/ Cost Total
Weighting Factors	1	1	1	4	4	4	3	2	3	3	3	5	5		
2A: Cap/-Slurry Wall/-Treatment/ Farmers Branch	5.546	1.833	7.380	3	3	1	2	2	1	2	3	2	1	71	9.8
2B: Cap/-Slurry Wall/-Treatment/POTW	5.329	1.833	7.366	3	3	1	2	2	1	2	3	3	2	81	11.0
3A: Cap/GW Ex/Treatment/ Farmers Branch	4.427	1.941	6.368	4	3	2	2	2	2	3	3	2	1	85	13.6
3B: Cap/GW Ex/Treatment/ POTW	4.424	1.941	6.365	4	3	2	2	2	2	3	3	3	2	95	15.2
4A: GW Ex/ Treatment/ Farmers Branch	0.850	1.941	2.791	4	2	3	3	2	3	3	2	2	1	88	32.5
4B: GW Ex/ Treatment/ POTW	0.847	1.941	2.788	4	2	3	3	2	3	3	2	3	2	98	36.1
5A: Slurry Wall/ Treatment/ Farmers Branch	1.970	1.833	3.803	3	3	1	2	2	1	2	3	2	1	71	18.7
5B: Slurry Wall/ Treatment/ POTW	1.956	1.833	3.789	3	3	1	2	2	1	2	3	3	2	81	21.4

O&M = Annual Operation and Maintenance Cost

NPV = Net Present Value

SOURCES: Radian, 1991; ESE.

Under the proposed system, groundwater containing TCE (2.34 mg/L) and 12DCE (0.39 mg/L) will be extracted from seven wells at approximately 135 gpm. The extracted groundwater will be treated to less than 0.005 mg/L each for TCE and DCE before discharging to the city sewer. The groundwater treatment system would consist of an air stripper, two blowers, sump, transfer pump, bag filter, and a 1,000-lb carbon canister.

An estimate of the influent concentrations to the pretreatment system from the seven extraction wells was determined, and the pretreatment system operating conditions are presented in Table 3.10-2.

3.10.2 REMEDIATION PROJECT OBJECTIVES

The remedial action objectives for these sites, as defined by the final FS for the Flightline Area are to:

1. Reduce or eliminate potential future impacts to human health and the environment;
2. Reduce or eliminate the potential for future contaminant migration in the groundwater; and
3. Reduce or eliminate the potential for continuing mobilization of metals and/or organic contaminants in near-surface soil (upper zone deposits) or residual wastes as leachate.

The constructed groundwater treatment system is working toward addressing response objectives 1 and 2 by extracting contaminated groundwater, treatment through an air stripper, and discharging to the POTW consisting of seven extraction wells.

3.10.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

A groundwater recovery treatment system, consisting of seven extraction wells and air stripping and carbon adsorption treatment units, has been installed (IT,

1994). No status reports referencing accomplishments of the treatment system were discovered during the file review.

3.10.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No status reports referencing data/information resulting from the project were discovered during the file review.

3.10.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

The final FS for the Flightline Area recommends implementing Alternative 4B for remediation of LF04 and LF05 and the WP07. Figure 3.10-2 depicts the location of extraction wells and the treatment plant for this alternative. IT, the contractor performing the installation of the treatment system, was contacted to obtain verbal information on the project, since information was unavailable in the file material. The remediation implemented at LF04 and LF05, as described by the IT project manager, appears to be based on Alternative 5B (Figure 3.10-3).

No status reports referencing other recommendations for additional studies/remediation were discovered during the file review.

3.10.6 PROJECTS RESULTING FROM THE PROJECT

A groundwater treatment system has been installed to treat groundwater at LF04 and LF05. The implementation of the remedial action appears to be based on the 1991 final FS for the Flightline Area.

3.10.7 PROJECT STATUS

The current status of the project was not available in the file material. The IRP schedule in the 1993 MAP references a projection that the remedial design and decision documents will be completed by September 1994, when remedial action is projected to commence.

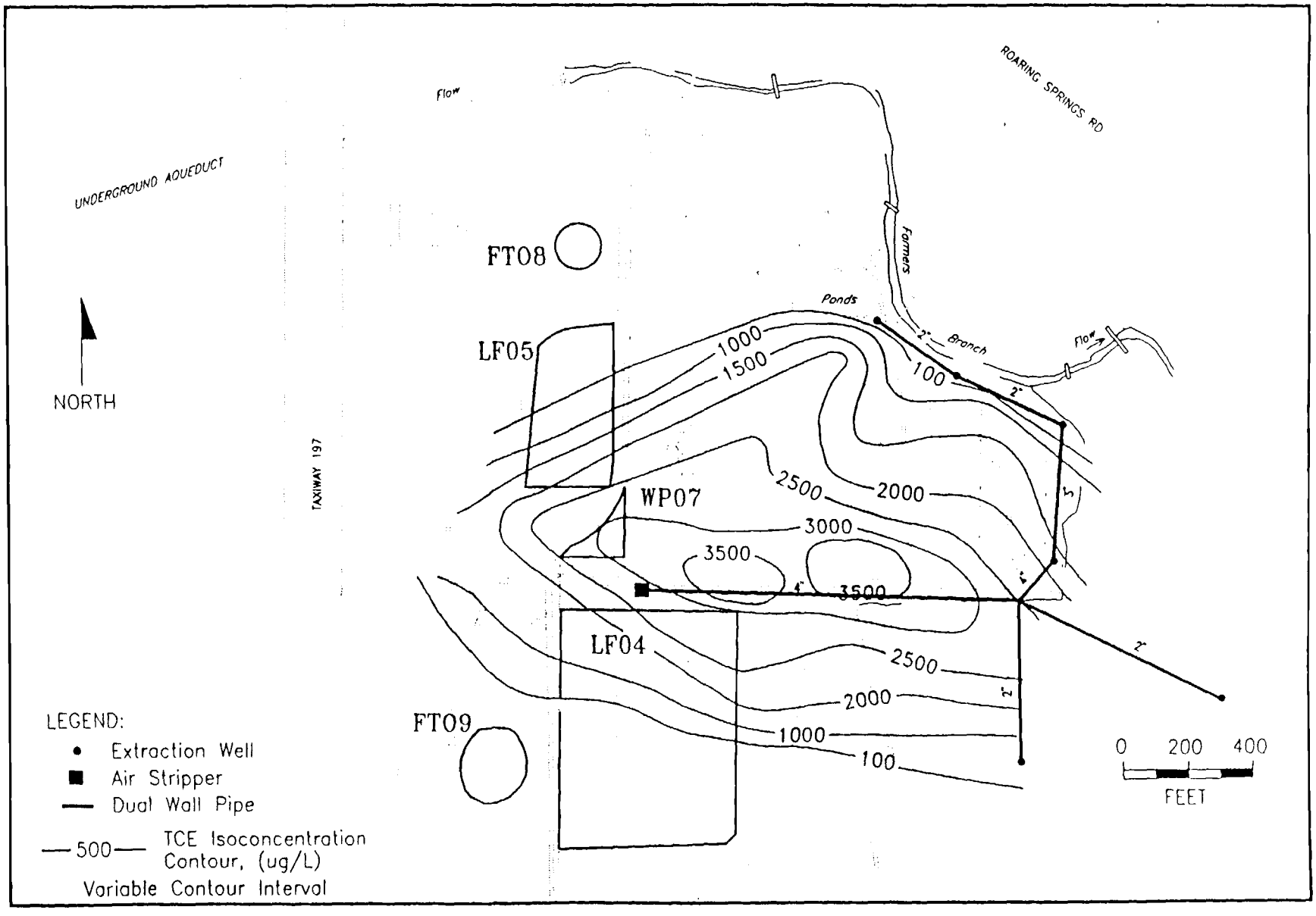


Figure 3.10-2
LOCATION OF EXTRACTION WELLS AND TREATMENT PLANT FOR ALTERNATIVE 4B

SOURCES: Radian, 1991; ESE.

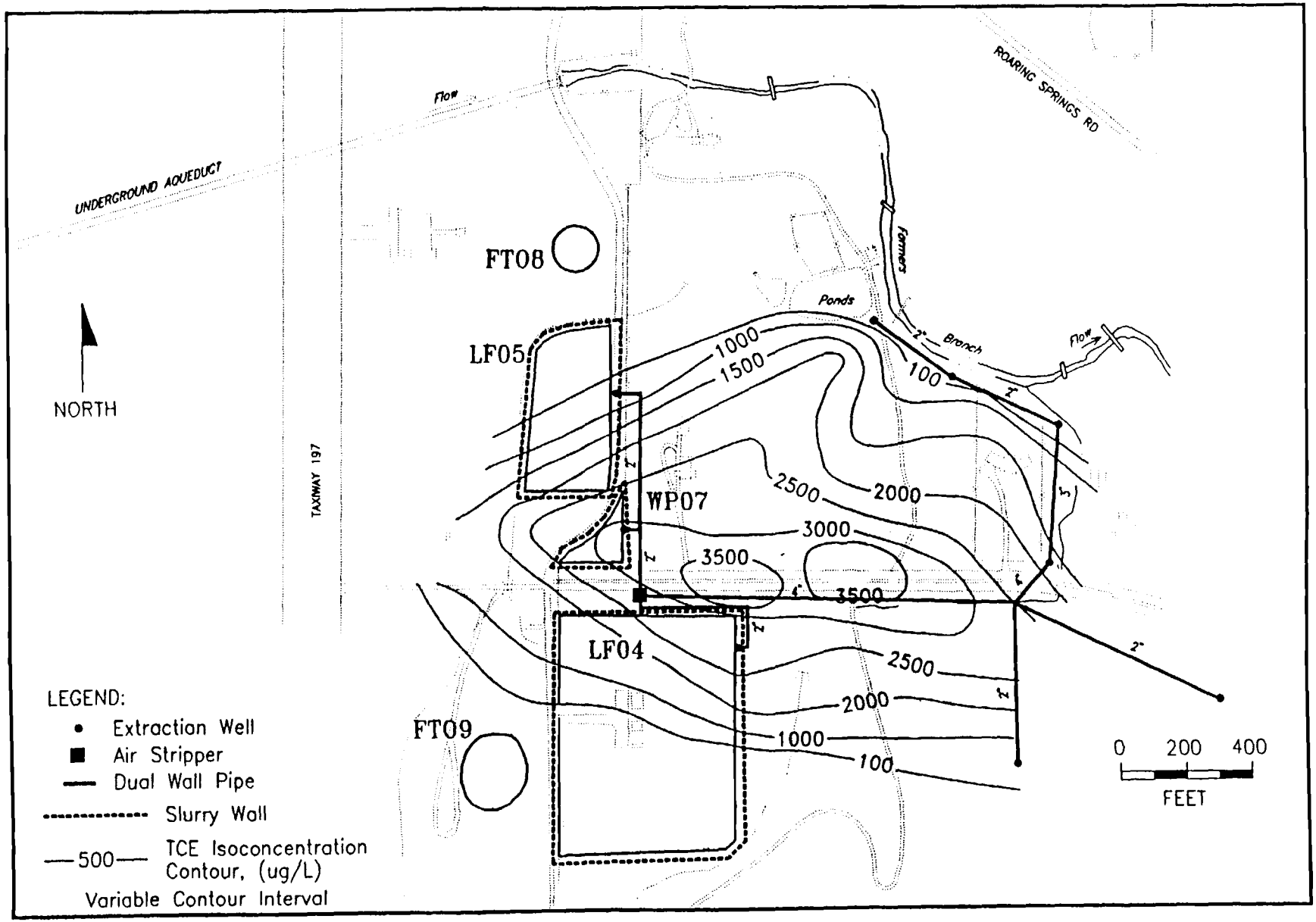


Figure 3.10-3 Alternative 5B

SOURCES: Radian, 1991; ESE.

IT was contacted to get an up-to-date status of the remedial action at LF04 and LF05. The following information was verbally communicated (IT, 1994):

1. Seven extraction wells are used to recover groundwater. The groundwater treatment system consists of an air stripper followed by carbon polishing. No offgas treatment for air stripper emissions is required.
2. Groundwater treatment has started.
3. The system was shut-down over the 1993 Christmas holidays due to fouling of carbon beds. The pH of water entering the system is 6.8 and effluent is 7.4. It is surmised that calcium carbonate precipitation was likely fouling the carbon beds.
4. The carbon beds appear to be unnecessary. Samples will be collected in January 1994 demonstrate that carbon polishing is unnecessary. Carbon polishing was required by the regulators. It is expected that data collection effort of January 1994 will support taking the carbon units offline.
5. The well production from the seven wells is good. All seven wells are screened in the upper aquifer. The system has been operating near design flow of 150 gpm.
6. Additional wells may enhance containment. No schedule is in place to determine the need for additional wells.
7. There is currently no schedule for the operation of the treatment system. This is an interim system.
8. There are no remedial design documents for this site. The design engineering documents were "short-circuited" in the interest of expediting system installation. It appears more wells are needed and that some unexpected contamination is present.

3.10.8 SCHEDULE

The 1993 MAP specified that the remedial design and decision documents will be completed in September 1994, when remedial action is scheduled to be

implemented. No other schedule information was identified in the records review.

3.10.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.10.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None were observed.

3.11 SWMU 68 POL TANK FARM (ST14)

In the early 1960s, soil contamination was detected at the POL Tank Farm; leaking underground pipes were subsequently replaced. No additional leakage of fuel was suspected since 1965. A soil gas investigation revealed that a 1,000 parts per million (ppm) organic compound plume exists in an area of approximately 100 by 300 ft in the vicinity of Tanks 1156 and 1157. Also, TPH was detected (maximum 8,900 mg/kg) at the site.

Arsenic, barium, cadmium, and chromium exceeded the MCLs in the groundwater samples. USACE recommended further investigation of the site for groundwater contamination. A preliminary RAP, submitted at a later date, recommended air stripping treatment for contaminated groundwater.

The site reportedly had an oil skimmer in operation from August 1991 through August 1993, at which time the device was scheduled to be removed from service. Figure 3.0-1 depicts the location of the POL Tank Farm on the base. Figure 3.11-1 depicts the ST14 site and identifies the well where 2 ft of free product was observed.

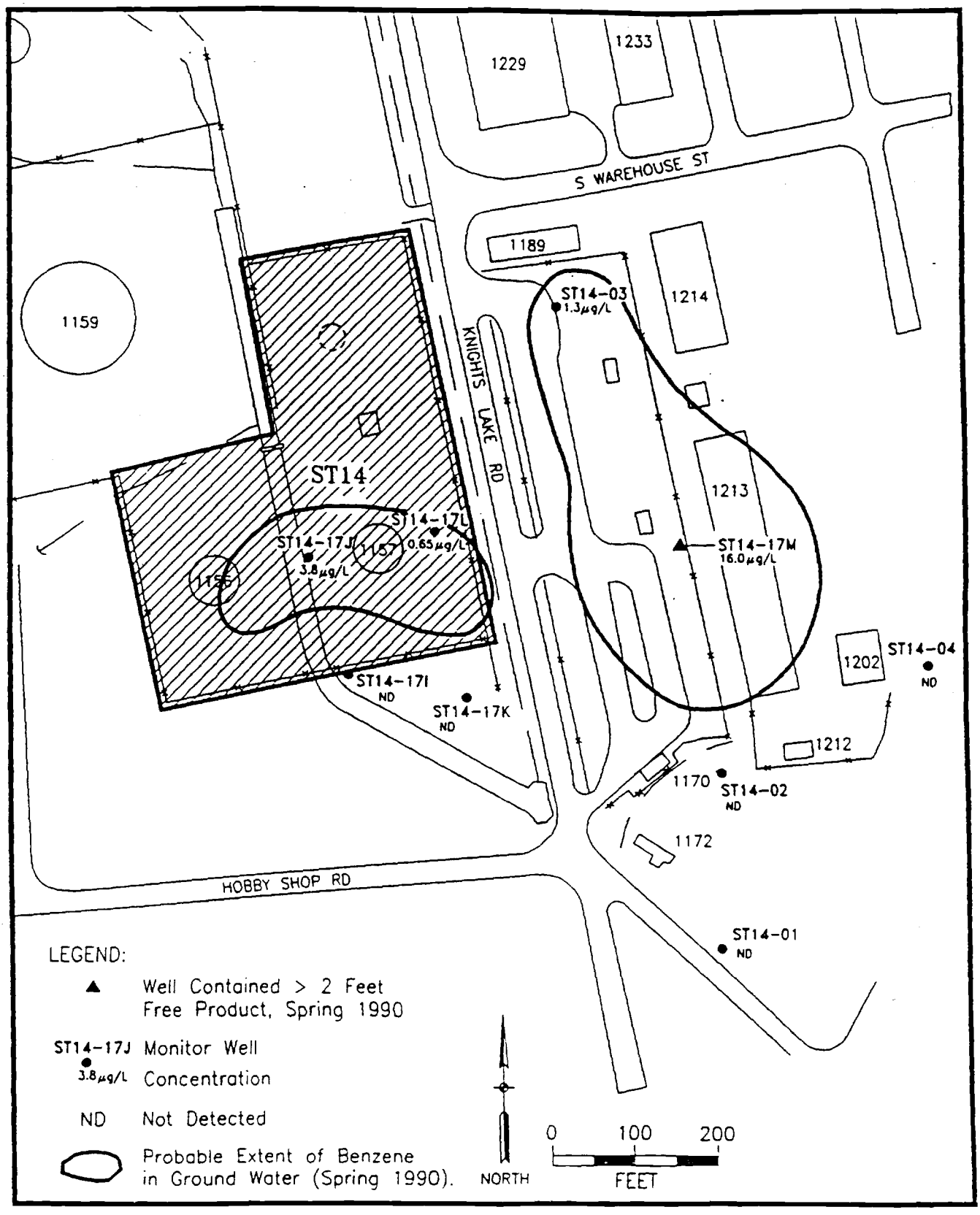


Figure 3.11-1
SITE LOCATION MAP FOR ST14
SOURCES: Radian, 1990; ESE.

3.11.1 SUMMARY OF REPORTS

Four reports were considered to contain information pertinent to the Task 2 objectives:

1. Draft-Final Feasibility Study for the East Area (Radian, 1991);
2. Summary of Permit Sites (USACE, 1991);
3. Preliminary Remedial Action Plan--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE, 1991); and
4. MAP, 1993.

Detailed summaries of each of these reports are presented in Appendix B. A brief description of the reports, as they pertain to ST14, is presented in the following paragraphs.

Draft-Final Feasibility Study for the East Area (Radian, 1991)

A draft FS was completed for the remediation of groundwater at the East Area. The East Area consists of four sites: LF01, Unnamed Stream (SD13), ST14, and Base Service Station (BSS). The FS evaluated several alternatives and selected the air stripping treatment alternative at the POL Tank Farm.

As an IRA, a skimmer was installed in August 1991 for the removal of free product from ST14; however, no free product was detected, and the skimmer was scheduled for removal in August 1993 (USACE, March 1993).

Summary of Permit Sites (USACE, 1991)

A brief site history and summary of previous investigative findings for the POL Tank Farm area were presented in this report (see Section 12.0 for this information).

Preliminary Remedial Action Plan--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE, 1991)

Groundwater treatment by air stripping was recommended as the remedial alternative at the POL Tank Farm. The details of the treatment alternative were presented in the Draft Feasibility Study for the Flightline Area (Radian, 1991).

MAP, 1993

The MAP states that an oil skimmer was installed on a well to skim free product off the top of the water-table to comply with a Notice of Violation (NOV). The skimmer was installed in August 1991. No product was recovered while the system was in place. The oil skimmer system was scheduled to be taken offline in August 1993.

3.11.2 REMEDIATION PROJECT OBJECTIVES

The only reference in the project file to any sort of remediation has been an IRA at the POL Tank Farm. An oil skimmer was installed at a well to recover free product.

3.11.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

The oil skimming system installed at the well was unsuccessful in recovering free product.

3.11.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

A remedial alternative involving extraction and treatment of contaminated groundwater, was recommended.

3.11.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

The draft-final FS for the East Area noted that a heavy rainfall in the weeks immediately preceding sampling may have caused some dilution of contaminant concentrations. However, the concentration variance possibly related to rainfall is not expected to differ greatly from previously observed data. Activities to

confirm this interpretation, especially with regard to lead concentrations in groundwater at the POL Tank Farm, should be performed. Furthermore, the final FS for the East Area recommends additional sampling to better delineate contamination.

3.11.6 PROJECTS RESULTING FROM THE PROJECT

None were identified in the file material.

3.11.7 PROJECT STATUS

The oil skimming system was scheduled to be taken offline in August 1993. Information regarding the status of this system was not available in the project files reviewed by ESE.

3.11.8 SCHEDULE

The oil skimming system was scheduled to be taken offline in August 1993. The MAP stated that RA and No Further Action (NFA) activities were projected to occur from December 1993 through December 1994. No information regarding the current schedule for this system was available in the project files reviewed by ESE.

3.11.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.11.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None were observed.

3.12 WASTE BURIAL AREA (WP07)--SWMU 24

The Waste Burial Area was used for burial of wastes during the 1960s and reportedly received solvents, leaded sludge, and possible ordnance materials. Various phthalates (maximum 390 μg/kg) were detected in the soil samples. TCE (maximum 11,000 μg/L) and chloroethene (850 μg/L) were detected in the

groundwater samples. USACE proposed that the groundwater at this site be treated with the groundwater at SWMU 22 and SWMU 23. Buried drums and contaminated soils were removed from this site between August and October 1991.

3.12.1 SUMMARY OF REPORTS FOR WASTE BURIAL AREA

Five reports were considered to contain information pertinent to the Task 2 objectives:

1. Draft Interim Investigation/Remediation Plan--Waste Burial Area (USACE, 1991);
2. Summary of Permit Sites (USACE, 1991);
3. Preliminary Remedial Action Plan--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE 1991);
4. Final Feasibility Study for the Flightline Area (Radian, 1991); and
5. MAP, 1993.

Detailed summaries of each of these reports are presented in Appendix B. The following paragraphs present a brief description of the reports, as they pertain to the Waste Burial Area.

Draft Interim Investigation/Remediation Plan--Waste Burial Area (USACE, 1991)
This report states that WP07 site was used for burial of wastes during the 1960s and reportedly received solvents, leaded sludge, and possible ordnance materials. Various phthalates (maximum 390 μg/kg) were detected in the soil samples. TCE (maximum 11,000 μg/L) and chloroethene (850 μg/L) were detected in groundwater samples. USACE proposed that the groundwater at this site be treated with the groundwater at SWMU 22 and SWMU 23 and RAP be submitted at a later date.

An SOW was included for removal of approximately twelve 55-gal drums and a 5,000-gal UST. A quality assurance/quality control (QA/QC) plan dated January 1991 was also provided in the report.

Summary of Permit Sites (USACE, 1991)

This report states that WP07 was used for burial of wastes during the 1960s and reportedly received solvents, leaded sludge, and possible ordnance materials. Various phthalates (maximum 390 μg/kg) were detected in the soil samples. TCE (maximum 11,000 μg/L) and chloroethene (850 μg/L) were detected in groundwater samples. USACE proposed that the groundwater at this site be treated with the groundwater at SWMUs 22 and 23 and that a RAP be submitted at a later date.

Preliminary Remedial Action Plan--SWMUs 16, 22, 23, 24, 32, 35, 61, and 68 (USACE 1991)

SWMUs 22, 23, and 24 were proposed for consideration as a combined site in dealing with the problem of TCE in groundwater. A second round of sampling in the area of the proposed combined site was recommended to determine the extent of groundwater contamination.

Installing a slurry wall to prevent the migration of contamination, placing a multimedia cap to prevent infiltration, and treating groundwater by air stripping was the recommended remedial alternative for the combined site. The details of the treatment alternative were presented in the Draft Feasibility Study for the Flightline Area (Radian, 1991).

Final Feasibility Study for the Flightline Area (Radian, 1991)

This FS was prepared for the Flightline Area sites LF04, LF05, and Waste Burial Area. The report was divided into the following three sections: (1) screening of remedial technologies, (2) development of remedial alternatives, and (3) detailed evaluation of alternatives.

In Section 1.0, technologies were screened for (1) performance and effectiveness, (2) constructibility and implementability, and (3) cost. Then the potentially applicable technologies were combined into seven remedial alternatives (Table 3.10-1) that were developed and screened against the broad criteria of effectiveness, implementability, and cost.

The alternatives were later evaluated in detail based on the following criteria:

1. Overall protection of human health and the environment,
2. Compliance with ARARs,
3. Long-term effectiveness and permanence,
4. Reduction of TMV,
5. Short-term effectiveness,
6. Implementability, and
7. Cost.

The comparative evaluation matrix for the nine alternatives is presented in Table 3.10-2. Based on this evaluation, Alternative 4B, Air Stripping and Disposal of Effluent to a POTW Sewerline, was selected as the preferred alternative for the remediation of groundwater at the Flightline Area.

MAP, 1993

The MAP reported that buried drums and contaminated soils were removed for the purposes of removing a contaminant source. Removal was conducted between August and October 1991.

3.12.2 REMEDIATION PROJECT OBJECTIVES

The objective of the IRA was to remove product discovered in a monitor well. The remedial action objectives for the site, as defined by the Final FS for the Flightline Area, were to:

1. Reduce or eliminate potential future impacts to human health and the environment,

2. Reduce or eliminate the potential for future contaminant migration in the groundwater, and
3. Reduce or eliminate the potential for continuing mobilization of metals and/or organic contaminants in near-surface soil (upper zone deposits) or residual wastes as leachate.

Progress towards achieving objectives 1 and 2 could be attempted by extracting contaminated groundwater, treating through an air stripper, and discharging the treated groundwater to a POTW.

3.12.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

No remediation accomplishments/results were identified in the file material reviewed by ESE.

3.12.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

A preferred alternative was recommended in the Final FS for the Flightline Area.

3.12.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

No recommendations for additional studies and/or remediation were identified in the records reviewed by ESE.

3.12.6 PROJECTS RESULTING FROM THE PROJECT

None were identified.

3.12.7 PROJECT STATUS

The records review did not reveal any information regarding the current status of the project.

3.12.8 SCHEDULE

The MAP projects that the remedial design (RD) and decision documents (DD) work will be prepared between April and September 1994, at which time the RA is projected to start. RA activities are projected to be performed through December 1994. No information regarding the current schedule for this system was available in the project files reviewed.

3.12.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.12.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None were observed.

3.13 FLIGHTLINE DRAINAGE DITCH (SD10 - SWMU 53)

The Flightline Drainage Ditch receives runoff from the flightline area and discharges from the aircraft washracks and the Fuel System Shop (Building 1048). TPH (maximum 3,500 mg/kg), ethylbenzene (750 μg/kg), and toluene (maximum 3,000 μg/kg) were detected in soil samples analyzed during the investigation. An interim remedial action involving the excavation of contaminated soils and lining a portion of the ditch with concrete was completed in December 1993. The Flightline Drainage Ditch is depicted in Figure 3.13-1.

3.13.1 SUMMARY OF REPORTS FOR FLIGHTLINE DRAINAGE DITCH

Four reports were considered to contain information pertinent to the Task 2 objectives:

1. Summary of Permit Sites (USACE, 1991),
2. 90% Plans and Specifications--Site SD10 (Radian, 1991),
3. 90% Design Cost Estimates--Site SD10 (Radian, 1991), and
4. MAP, 1993.

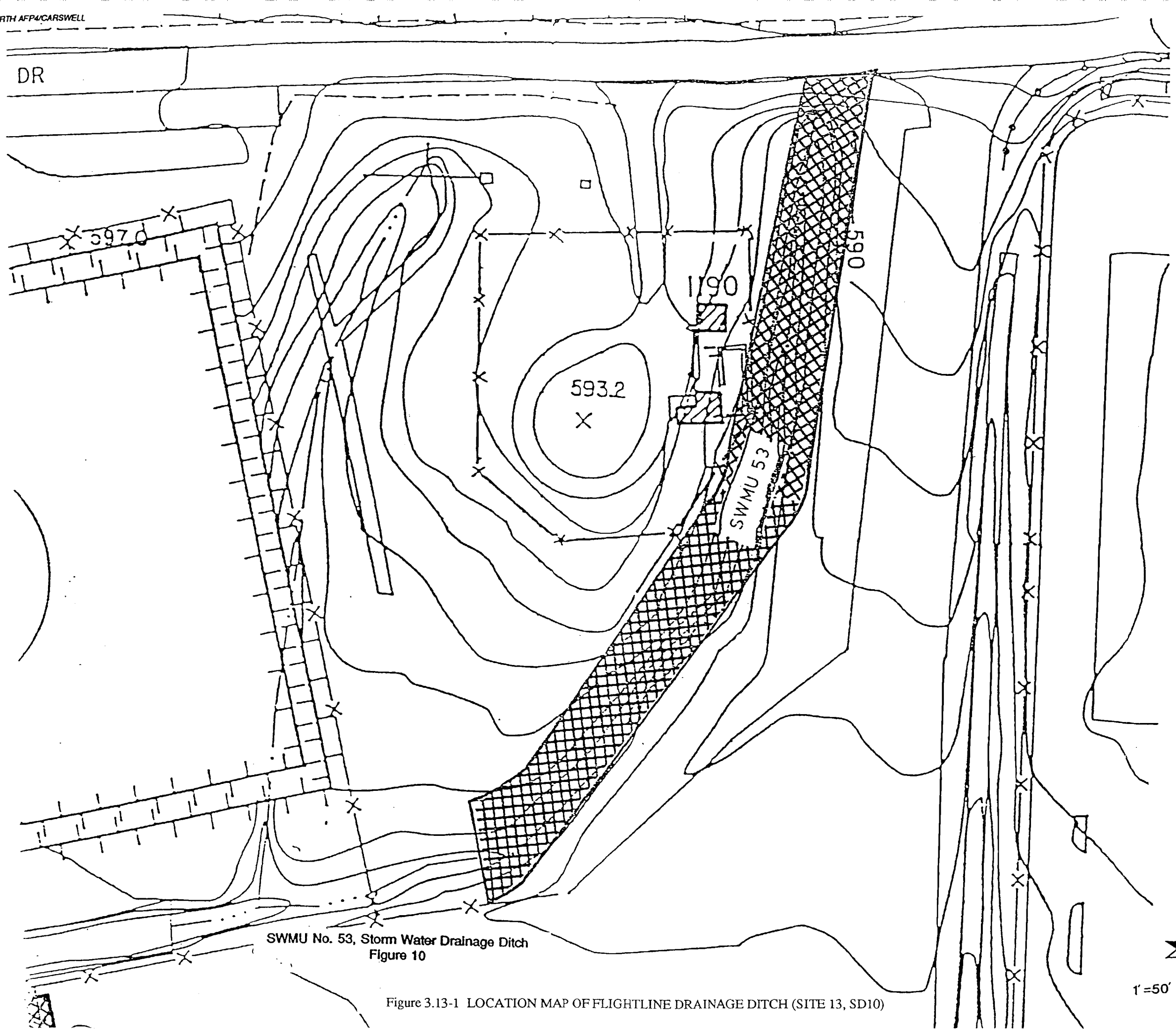


Figure 3.13-1 LOCATION MAP OF FLIGHTLINE DRAINAGE DITCH (SITE 13, SD10)

Detailed summaries of each of these reports, as they pertain to the Flightline Drainage Ditch, are presented in Appendix B. A brief description of the reports is presented in the following paragraphs.

Summary of Permit Sites (USACE, 1991)

This report presented the following brief history of the Flightline Drainage Ditch. The Flightline Drainage Ditch receives runoff from the flightline area and discharges from the aircraft washracks and the Fuel System Shop (Building 1048). TPH (maximum 3,500 mg/kg), ethylbenzene (750 μg/kg), and toluene (maximum 3,000 μg/kg) were detected in soil samples analyzed during the investigation. An interim remedial action involving the excavation of contaminated soils and lining a portion of the ditch with concrete was completed in December 1993. The Flightline Drainage Ditch is depicted in Figure 3.13-1.

90% Plans and Specifications--Site SD10 (Radian, 1991)

Plans and specifications were prepared for work with the following principal features:

1. Remove and dispose of four transite pipes;
2. Remove and dispose of miscellaneous structures, including a wooden trestle, concrete structures, asbestos-containing material, and miscellaneous utility piping;
3. Analyze, excavate, remove, and dispose of contaminated soils from ditch;
4. Perform verification and disposal sampling;
5. Install a 167-ft long, 60-inch diameter RCP culvert with headwall, including backfill, compaction, and grading;
6. Install a concrete lining and drop/transition structure for a 433-ft channel, including backfill, compaction, and grading; and
7. Fill all disturbed areas with topsoil and seed them.

90% Design Cost Estimates--Site SD10 (Radian, 1991)

A cost estimate for the remediation of the Flightline Drainage Ditch was prepared based on the assumption that all contaminated soils would be disposed of offsite in a Class I landfill.

MAP, 1993

The MAP projects RA and NFA activities to be conducted during the period between January and December 1993.

3.13.2 REMEDIATION PROJECT OBJECTIVES

See the summary for the 90 percent plans and specifications, presented in Section 3.14.1.

3.13.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Contaminated soils were excavated from the Flightline Drainage Ditch in November 1993. A concrete liner and culvert were installed in the channel in December 1993 (COE, 1994).

3.13.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

Based on a review of the file material, no data/information were developed as part of the actions taken in November and December 1993.

3.13.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

The intent of the site activities at the Flightline Drainage Ditch was to complete a final remedial action. However, the state considers the work performed to date to be an interim remedial action (USACE, 1994). The reason the state refused to accept remediation at the Flightline Drainage Ditch as final were not available in the file material reviewed by ESE. Therefore, additional studies and/or remediation may be required before the site can be closed.

3.13.6 PROJECTS RESULTING FROM THE PROJECT

The review of the file material did not indicate any projects resulting from this project.

3.13.7 PROJECT STATUS

The removal of contaminated soil from the ditch and the installation of the culvert and concrete liner in the channel is complete. The excavated soils have been staged onbase, and are awaiting transportation to an offsite disposal facility.

3.13.8 SCHEDULE

The excavation of contaminated soils and the lining of the channel is complete. The stockpiled soils are scheduled to be disposed of at an offsite facility (USACE, 1994). However, the date was not available in the file material.

3.13.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.13.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

None were observed in the file material reviewed for this project.

3.14 FTA-2 (SWMUS 19, 20, AND 21)

Results of soil sampling and analysis during RI/FS studies indicated that several organic constituents, including benzene, ethylbenzene, xylenes, 2 methylnaphthalene, 4-methylphenol, phenol, and naphthalene occurred in the soil beneath FTA-2. FTA-2 is depicted in Figure 3.14-1.

The highest contaminant concentrations occurred at the surface, decreasing with depth. However, in boreholes in which a sand zone was encountered at approximately 24 ft-bgs, the maximum values of contaminants were found in the sand strata above the water table. Petroleum hydrocarbon constituents were also

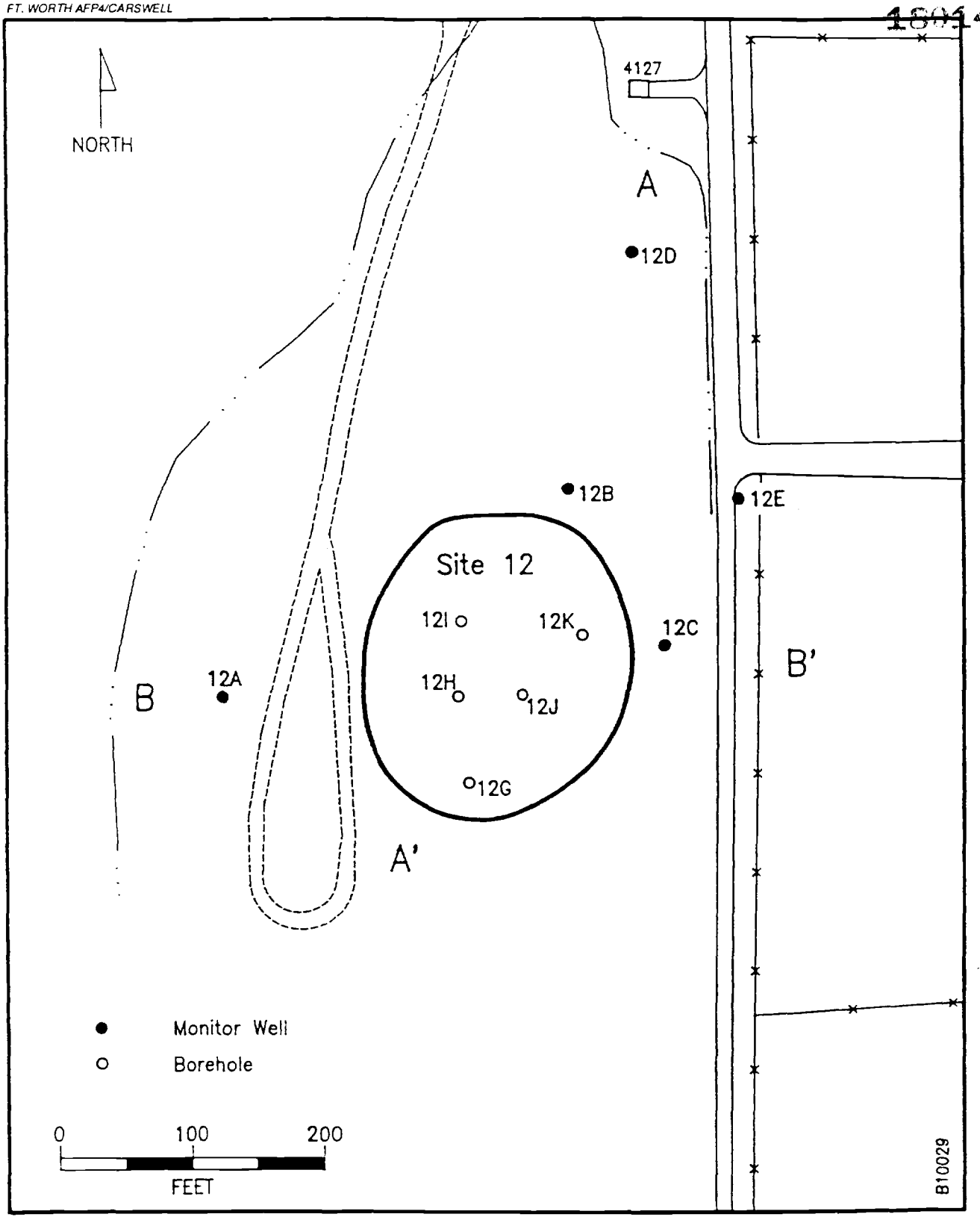


Figure 3.14-1
LOCATION MAP FOR FTA-2 (SITE 12, FT09)
SOURCES: Radian, 1990; ESE.

detected in the groundwater (Table 3.14-1). The highest concentration of contaminants were detected at MW 12H, in the 19- to 25-ft soil depth range, which lies directly above the groundwater zone. Table 3.14-2 shows the concentration of petroleum hydrocarbons; ethylbenzene; toluene; 1,1,2,2,-tetrachloroethane; and acetone at FTA-2. Soils from the site have been excavated and are currently being treated onsite using a biological treatment process.

3.14.1 SUMMARY OF REPORTS FOR FTA-2

Five reports were considered to contain information pertinent to the Task 2 objectives:

1. Decision Paper--Site 12 (Radian, 1990);
2. Summary of Permit Site (USACE, 1991);
3. 90% Plans and Specifications--Site 12 (Radian, 1991);
4. 90% Design Cost Estimate--Site 12 (Radian, 1991); and
5. MAP, 1993.

Detailed summaries of each of these reports, as they pertain to FTA-2, are presented in Appendix B. The following paragraphs present a brief description of the reports.

Decision Paper--Site 12 (Radian, 1990)

This report analyzed the previous studies conducted at FTA-2 for selection of a remediation alternative. Based on the previous investigation results, the following seven alternatives were evaluated:

1. No further action.
2. Onsite aeration of the top 2 ft of contaminated soils located within the outer 200-ft earthen berm.
3. Removal and offsite disposal of the top 2 ft of contaminated soils within the 200-ft earthen berm in a landfill.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well / Sample ID / Date Sampled: 12A 02-154 25-Feb-88		12A 04-04 06-Apr-88		12B 03-24 03-Mar-88		12B 03-25 03-Mar-88	
Petroleum Hydrocarbons UG/L										
Petroleum Hydrocarbons			ND	(200.0)	ND	(200.0)	ND	(200.0)	ND	(200.0)
Purgeable Halocarbons UG/L										
1,1,1-Trichloroethane	200.0(M)	200.0(G)	ND	(0.090)	ND	(0.090)	ND	(2.3)	ND	(2.3)
1,1,2,2-Tetrachloroethane			ND	(0.12)	ND	(0.12)	ND	(3.0)	ND	(3.0)
1,1,2-Trichloroethane			ND	(0.070)	ND	(0.070)	ND	(1.8)	ND	(1.8)
1,1-Dichloroethane			ND	(0.090)	ND	(0.090)	ND	(2.3)	ND	(2.3)
1,1-Dichloroethene	7.0(M)	7.0(G)	ND	(0.10)	ND	(0.10)	ND	(2.5)	ND	(2.5)
1,2-Dichlorobenzene	620.0(G)		ND	(0.50)	ND	(0.50)	ND	(13.0)	ND	(13.0)
1,2-Dichloroethane	5.0(M)	0.0(G)	ND	(0.030)	ND	(0.030)	ND	(0.75)	ND	(0.75)
1,2-Dichloropropane			ND	(0.10)	ND	(0.10)	ND	(2.5)	ND	(2.5)
1,3-Dichlorobenzene	400.0(G)		ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(0.40)	ND	(0.40)	ND	(10.0)	ND	(10.0)
2-Chloroethylvinyl ether			ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
Bromodichloromethane			ND	(0.10)	ND	(0.10)	ND	(2.5)	ND	(2.5)
Bromoform			ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)
Bromomethane			ND	(1.2)	ND	(1.2)	ND	(30.0)	ND	(30.0)
Carbon tetrachloride	5.0(M)	0.0(G)	ND	(0.10)	ND	(0.10)	ND	(2.5)	ND	(2.5)
Chlorobenzene	60.0(G)		ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)
Chloroethane			ND	(0.50)	ND	(0.50)	ND	(13.0)	ND	(13.0)
Chloroform			ND	(0.050)	0.20	(0.050)	ND	(1.3)	ND	(1.3)
Chloromethane			ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)
Dibromochloromethane			ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
Methylene chloride			ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

4: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

B: Detected in Reagent Blank; background subtraction not performed

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well Sample ID / Date Sampled: 12A 02-154 25-Feb-88		12A 04-04 06-Apr-88		12B 03-24 03-Mar-88		12B 03-25 03-Mar-88	
Tetrachloroethene	8.0(G)		ND	(0.030)	0.030	(0.030)	42.0	(0.75)	43.0	(0.75)
Trichloroethene	5.0(M)	0.0(G)	ND	(0.20)	0.20	(0.20)	110.0	(5.0)	110.0	(5.0)
Trichlorofluoromethane			ND	(0.10)	ND	(0.10)	ND	(2.5)	ND	(2.5)
Vinyl chloride	2.0(M)	0.0(G)	ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
cis-1,3-Dichloropropene			ND&		ND&		ND&		ND&	
trans-1,2-Dichloroethene	70.0(G)		ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
trans-1,3-Dichloropropene			ND	(0.30)	ND	(0.30)	ND	(7.5)	ND	(7.5)
Purgeable Aromatics UG/L										
1,2-Dichlorobenzene	620.0(G)		ND	(0.40)	ND	(0.40)	ND	(10.0)	ND	(10.0)
1,3-Dichlorobenzene	400.0(G)		ND	(0.40)	ND	(0.40)	ND	(10.0)	ND	(10.0)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(0.30)	ND	(0.30)	ND	(8.0)	ND	(8.0)
Benzene	5.0(M)	0.0(G)	ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
Chlorobenzene	60.0(G)		ND	(0.30)	ND	(0.30)	ND	(8.0)	ND	(8.0)
Ethylbenzene	680.0(G)		ND	(0.30)	ND	(0.30)	ND	(8.0)	ND	(8.0)
Toluene	2000.0(G)		1.1	(0.20)	1.2	(0.20)	9.0	(5.0)	ND	(5.0)
m-Xylene			ND	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
o-Xylene			ND	(0.10)	ND	(0.10)	ND	(3.0)	ND	(3.0)
p-Xylene			NDQ	(0.20)	ND	(0.20)	ND	(5.0)	ND	(5.0)
Extractable Priority Pollutants UG/L										
1,2,4-trichlorobenzene			ND	(2.0)						
1,2-dichlorobenzene			ND	(2.0)						
1,3-dichlorobenzene			ND	(2.0)						
1,4-dichlorobenzene	750.0(G)		ND	(4.5)						

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

SOURCES: Radian, 1990; ESE.

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

B: Detected in Reagent Blank; background subtraction not performed

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFb, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well Sample ID / Date Sampled: 12A 02-154 25-Feb-88	12A 04-04 06-Apr-88	12B 03-24 03-Mar-88	12B 03-25 03-Mar-88
2,4,5-trichlorophenol		ND (10.0)			
2,4,6-trichlorophenol		ND (2.8)			
2,4-dichlorophenol	3090.0(G)	ND (2.8)			
2,4-dimethylphenol	400.0(G)	ND (2.8)			
2,4-dinitrophenol		ND (43.0)			
2,4-dinitrotoluene		ND (5.9)			
2,6-dinitrotoluene		ND (2.0)			
2-chloronaphthalene		ND (2.0)			
2-chlorophenol		ND (3.4)			
2-methylnaphthalene		ND (10.0)			
2-methylphenol		ND (10.0)			
2-nitroaniline		ND (52.0)			
2-nitrophenol		ND (3.7)			
3,3'-dichlorobenzidine		ND (17.0)			
4,6-dinitro-2-methylphenol		ND (25.0)			
4-bromophenyl-phenylether		ND (2.0)			
4-chloro-3-methylphenol		ND (3.1)			
4-chloroaniline		ND (10.0)			
4-chlorophenyl-phenylether		ND (4.3)			
4-methylphenol		ND (10.0)			
4-nitroaniline		ND (52.0)			
4-nitrophenol		ND (2.5)			
acenaphthene	0.030(G)	ND (2.0)			
acenaphthylene		ND (3.6)			
aniline		ND (10.0)			

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

B: Detected in Reagent Blank; background subtraction not performed

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well Sample ID Date Sampled 12A 02-154 25-Feb-88	12A 04-04 06-Apr-88	12B 03-24 03-Mar-88	12B 03-25 03-Mar-88
anthracene		ND (2.0)			
benzidine		ND (45.0)			
benzo(a)anthracene		ND (8.0)			
benzo(a)pyrene		ND (2.6)			
benzo(b)fluoranthene		ND (4.9)			
benzo(g,h,i)perylene		ND (4.2)			
benzo(k)fluoranthene		ND (2.6)			
benzoic acid		ND (52.0)			
benzyl alcohol		ND (52.0)			
bis(2-chloroethoxy)methane		ND (5.5)			
bis(2-chloroethyl) ether		ND (5.9)			
bis(2-chloroisopropyl)ether		ND (5.9)			
bis(2-ethylhexyl)phthalate	15000.0(G)	17.0 (2.6)			
butylbenzylphthalate	940.0(G)	ND (2.6)			
chrysene		ND (2.6)			
di-n-butylphthalate	35000.0(G)	4.2B (2.6)			
di-n-octyl phthalate		ND (2.6)			
dibenzo(a,h)anthracene		ND (2.6)			
dibenzofuran		ND (10.0)			
diethylphthalate		ND (2.0)			
dimethyl phthalate		ND (1.6)			
fluoranthene	0.030(G)	ND (2.3)			
fluorene	0.030(G)	ND (2.0)			
hexachlorobenzene		ND (2.0)			
hexachlorobutadiene		ND (0.93)			

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

B: Detected in Reagent Blank; background subtraction not performed

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well / Sample ID / Date Sampled: 12A / 02-154 / 25-Feb-88	12A / 04-04 / 06-Apr-88	12B / 03-24 / 03-Mar-88	12B / 03-25 / 03-Mar-88
hexachlorocyclopentadiene		ND (6.2)			
hexachloroethane		ND (1.6)			
indeno(1,2,3-cd)pyrene		ND (3.8)			
isophorone	5200.0(G)	ND (2.3)			
n-nitroso-di-n-propylamine		ND (12.0)			
n-nitrosodimethylamine		ND (10.0)			
n-nitrosodiphenylamine		ND (2.0)			
naphthalene	620.0(G)	ND (1.6)			
nitrobenzene		ND (2.0)			
pentachlorophenol	200.0(G)	ND (3.7)			
phenanthrene	0.030(G)	ND (5.6)			
phenol	3500.0(G)	ND (1.5)			
pyrene	0.030(G)	ND (2.0)			

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

B: Detected in Reagent Blank; background subtraction not performed

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well Sample ID / Date Sampled 12B 04-57 13-Apr-88		12C 03-26 03-Mar-88		12C 04-59 11-Apr-88		12D 03-23 03-Mar-88	
Petroleum Hydrocarbons UG/L										
Petroleum Hydrocarbons			ND	(200.0)	600.0		ND	(200.0)	ND	(200.0)
Purgeable Halocarbons UG/L										
1,1,1-Trichloroethane	200.0(M)	200.0(G)	ND	(2.3)	0.30	(0.090)	ND	(0.90)	ND	(2.3)
1,1,2,2-Tetrachloroethane			ND	(3.0)	ND	(0.12)	ND	(1.2)	ND	(3.0)
1,1,2-Trichloroethane			ND	(1.8)	ND	(0.070)	ND	(0.70)	ND	(1.8)
1,1-Dichloroethane			ND	(2.3)	3.2	(0.090)	ND	(0.90)	ND	(2.3)
1,1-Dichloroethene	7.0(M)	7.0(G)	ND	(2.5)	ND	(0.10)	ND	(1.0)	ND	(2.5)
1,2-Dichlorobenzene	620.0(G)		ND	(13.0)	ND	(2.5)	ND	(5.0)	ND	(13.0)
1,2-Dichloroethane	5.0(M)	0.0(G)	ND	(0.75)	ND	(0.030)	ND	(0.30)	ND	(0.75)
1,2-Dichloropropane			ND	(2.5)	ND	(0.10)	ND	(1.0)	ND	(2.5)
1,3-Dichlorobenzene	400.0(G)		ND	(7.5)	ND	(1.5)	ND	(3.0)	ND	(7.5)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(10.0)	ND	(2.0)	ND	(4.0)	ND	(10.0)
2-Chloroethylvinyl ether			ND	(5.0)	ND	(0.20)	ND	(2.0)	ND	(5.0)
Bromodichloromethane			ND	(2.5)	ND	(0.10)	ND	(1.0)	ND	(2.5)
Bromoform			ND	(7.5)	ND	(0.30)	ND	(3.0)	ND	(7.5)
Bromomethane			ND	(30.0)	ND	(1.2)	ND	(12.0)	ND	(30.0)
Carbon tetrachloride	5.0(M)	0.0(G)	ND	(2.5)	ND	(0.10)	ND	(1.0)	ND	(2.5)
Chlorobenzene	60.0(G)		ND	(7.5)	ND	(1.5)	ND	(3.0)	ND	(7.5)
Chloroethane			ND	(13.0)	ND	(0.50)	ND	(5.0)	ND	(13.0)
Chloroform			ND	(1.3)	ND	(0.050)	ND	(0.50)	ND	(1.3)
Chloromethane			ND	(7.5)	ND	(0.30)	ND	(3.0)	ND	(7.5)
Dibromochloromethane			ND	(5.0)	ND	(0.20)	ND	(2.0)	ND	(5.0)
Methylene chloride			ND	(7.5)	ND	(0.30)	ND	(3.0)	ND	(7.5)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

J: Estimated value (GC test codes)

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well / Sample ID / Date Sampled: 12B 04-57 13-Apr-88		12C 03-26 03-Mar-88		12C 04-59 11-Apr-88		12D 03-23 03-Mar-88	
Tetrachloroethene	8.0(G)		49.0	(0.75)	2.5	(0.030)	2.7	(0.30)	ND	(0.75)
Trichloroethene	5.0(M)	0.0(G)	100.0	(5.0)	3.0	(0.20)	ND	(2.0)	48.0	(5.0)
Trichlorofluoromethane			ND	(2.5)	ND	(0.10)	ND	(1.0)	ND	(2.5)
Vinyl chloride	2.0(M)	0.0(G)	ND	(5.0)	18.0	(0.20)	15.0	(2.0)	ND	(5.0)
cis-1,3-Dichloropropene			ND&		ND&		ND&		ND&	
trans-1,2-Dichloroethene	70.0(G)		ND	(5.0)	ND	(0.20)	ND	(2.0)	ND	(5.0)
trans-1,3-Dichloropropene			ND	(7.5)	ND	(0.30)	ND	(3.0)	ND	(7.5)
Purgeable Aromatics UG/L										
1,2-Dichlorobenzene	620.0(G)		ND	(2.0)	ND	(0.40)	2.3	(0.40)	ND	(0.40)
1,3-Dichlorobenzene	400.0(G)		ND	(2.0)	ND	(0.40)	ND	(0.40)	ND	(0.40)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(2.0)	ND	(0.30)	1.4	(0.30)	ND	(0.30)
Benzene	5.0(M)	0.0(G)	ND	(1.0)	ND	(0.20)	ND	(0.20)	ND	(0.20)
Chlorobenzene	60.0(G)		ND	(2.0)	ND	(0.30)	ND	(0.30)	ND	(0.30)
Ethylbenzene	680.0(G)		ND	(2.0)	ND	(0.30)	ND	(0.30)	ND	(0.30)
Toluene	2000.0(G)		ND	(1.0)	17.0	(0.20)	1.0	(0.20)	7.6	(0.20)
m-Xylene			ND	(1.0)	ND	(0.20)	ND	(0.20)	ND	(0.20)
o-Xylene			ND	(0.50)	ND	(0.10)	ND	(0.10)	ND	(0.10)
p-Xylene			NDQ	(1.0)	ND	(0.20)	NDQ	(0.20)	ND	(0.20)
Extractable Priority Pollutants UG/L										
1,2,4-trichlorobenzene							ND	(2.5)		
1,2-dichlorobenzene							2.3J	(2.5)		
1,3-dichlorobenzene							ND	(2.5)		
1,4-dichlorobenzene	750.0(G)						ND	(5.8)		

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

J: Estimated value (GC test codes)

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well Sample ID / Date Sampled: 12B 04-57 13-Apr-88	12C 03-26 03-Mar-88	12C 04-59 11-Apr-88		12D 03-23 03-Mar-88
2,4,5-trichlorophenol				ND	(13.0)	
2,4,6-trichlorophenol				ND	(3.6)	
2,4-dichlorophenol	3090.0(G)			ND	(3.6)	
2,4-dimethylphenol	400.0(G)			ND	(3.6)	
2,4-dinitrophenol				ND	(55.0)	
2,4-dinitrotoluene				ND	(7.5)	
2,6-dinitrotoluene				ND	(2.5)	
2-chloronaphthalene				ND	(2.5)	
2-chlorophenol				ND	(4.4)	
2-methylnaphthalene				ND	(13.0)	
2-methylphenol				ND	(13.0)	
2-nitroaniline				ND	(66.0)	
2-nitrophenol				ND	(4.8)	
3,3'-dichlorobenzidine				ND	(22.0)	
4,6-dinitro-2-methylphenol				ND	(32.0)	
4-bromophenyl-phenylether				ND	(2.5)	
4-chloro-3-methylphenol				ND	(4.0)	
4-chloroaniline				ND	(13.0)	
4-chlorophenyl-phenylether				ND	(5.5)	
4-methylphenol				ND	(13.0)	
4-nitroaniline				ND	(66.0)	
4-nitrophenol				ND	(3.2)	
acenaphthene	0.030(G)			ND	(2.5)	
acenaphthylene				ND	(4.6)	
anthracene				ND	(2.5)	

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

J: Estimated value (GC test codes)

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well Sample ID / Date Sampled: 12B 04-57 13-Apr-88	12C 03-26 03-Mar-88	12C 04-59 11-Apr-88	12D 03-23 03-Mar-88
benzo(a)anthracene				ND (10.0)	
benzo(a)pyrene				ND (3.3)	
benzo(b)fluoranthene				ND (6.3)	
benzo(g,h,i)perylene				ND (5.4)	
benzo(k)fluoranthene				ND (3.3)	
benzoic acid				ND (66.0)	
benzyl alcohol				ND (66.0)	
bis(2-chloroethoxy)methane				ND (7.0)	
bis(2-chloroethyl) ether				ND (7.5)	
bis(2-chloroisopropyl)ether				ND (7.5)	
bis(2-ethylhexyl)phthalate	15000.0(G)			2.3J (3.3)	
butylbenzylphthalate	940.0(G)			8.9 (3.3)	
chrysene				ND (3.3)	
di-n-butylphthalate	35000.0(G)			1.4J (3.3)	
di-n-octyl phthalate				ND (3.3)	
dibenzo(a,h)anthracene				ND (3.3)	
dibenzofuran				ND (13.0)	
diethylphthalate				ND (2.5)	
dimethyl phthalate				ND (2.1)	
fluoranthene	0.030(G)			ND (2.9)	
fluorene	0.030(G)			ND (2.5)	
hexachlorobenzene				ND (2.5)	
hexachlorobutadiene				ND (1.2)	
hexachlorocyclopentadiene				ND (7.9)	
hexachloroethane				ND (2.1)	

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

J: Estimated value (GC test codes)

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria	Monitor Well Sample ID / Date Sampled: 12B 04-57 13-Apr-88	12C 03-26 03-Mar-88	12C 04-59 11-Apr-88	12D 03-23 03-Mar-88
indeno(1,2,3-cd)pyrene				ND (4.9)	
isophorone	5200.0(G)			ND (2.9)	
n-nitroso-di-n-propylamine				ND (16.0)	
n-nitrosodiphenylamine				ND (2.5)	
naphthalene	620.0(G)			ND (2.1)	
nitrobenzene				ND (2.5)	
pentachlorophenol	200.0(G)			ND (4.8)	
phenanthrene	0.030(G)			ND (7.1)	
phenol	3500.0(G)			ND (2.0)	
pyrene	0.030(G)			ND (2.5)	

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

J: Estimated value (GC test codes)

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well Sample ID Date Sampled 12D 04-53 13-Apr-88		12E 03-27 03-Mar-88		12E 04-56 13-Apr-88	
Petroleum Hydrocarbons UG/L								
Petroleum Hydrocarbons			ND	(200.0)	ND	(200.0)	ND	(200.0)
Purgeable Halocarbons UG/L								
1,1,1-Trichloroethane	200.0(M)	200.0(G)	ND	(2.3)	ND	(0.090)	0.40	(0.090)
1,1,2,2-Tetrachloroethane			ND	(3.0)	ND	(0.12)	ND	(0.12)
1,1,2-Trichloroethane			ND	(1.8)	ND	(0.070)	ND	(0.070)
1,1-Dichloroethane			ND	(2.3)	0.80	(0.090)	0.40	(0.090)
1,1-Dichloroethene	7.0(M)	7.0(G)	ND	(2.5)	ND	(0.10)	ND	(0.10)
1,2-Dichlorobenzene	620.0(G)		ND	(13.0)	ND	(0.50)	ND	(0.50)
1,2-Dichloroethane	5.0(M)	0.0(G)	ND	(0.75)	ND	(0.030)	ND	(0.030)
1,2-Dichloropropane			ND	(2.5)	ND	(0.10)	ND	(0.10)
1,3-Dichlorobenzene	400.0(G)		ND	(7.5)	ND	(0.30)	ND	(0.30)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(10.0)	2.6	(0.40)	1.6	(0.40)
2-Chloroethylvinyl ether			ND	(5.0)	ND	(0.20)	ND	(0.20)
Bromodichloromethane			ND	(2.5)	ND	(0.10)	ND	(0.10)
Bromoform			ND	(7.5)	ND	(0.30)	ND	(0.30)
Bromomethane			ND	(30.0)	ND	(1.2)	ND	(1.2)
Carbon tetrachloride	5.0(M)	0.0(G)	ND	(2.5)	ND	(0.10)	ND	(0.10)
Chlorobenzene	60.0(G)		ND	(7.5)	ND	(0.30)	ND	(0.30)
Chloroethane			ND	(13.0)	1.5	(0.50)	0.60	(0.50)
Chloroform			ND	(1.3)	ND	(0.050)	ND	(0.050)
Chloromethane			ND	(7.5)	ND	(0.30)	ND	(0.30)
Dibromochloromethane			ND	(5.0)	ND	(0.20)	ND	(0.20)
Methylene chloride			ND	(7.5)	ND	(0.30)	ND	(0.30)
Tetrachloroethene	8.0(G)		ND	(0.75)	ND	(0.030)	0.30	(0.030)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-1 RESULTS OF ORGANIC ANALYSES FOR WATER SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	EPA Standards, Criteria		Monitor Well Sample ID / Date Sampled 12D 04-53 13-Apr-88		12E 03-27 03-Mar-88		12E 04-56 13-Apr-88	
Trichloroethene	5.0(M)	0.0(G)	55.0	(5.0)	0.80	(0.20)	1.1	(0.20)
Trichlorofluoromethane			ND	(2.5)	ND	(0.10)	ND	(0.10)
Vinyl chloride	2.0(M)	0.0(G)	ND	(5.0)	3.4	(0.20)	1.8	(0.20)
cis-1,3-Dichloropropene			ND&		ND&		ND&	
trans-1,2-Dichloroethene	70.0(G)		ND	(5.0)	ND	(0.20)	ND	(0.20)
trans-1,3-Dichloropropene			ND	(7.5)	ND	(0.30)	ND	(0.30)
Purgeable Aromatics UG/L								
1,2-Dichlorobenzene	620.0(G)		ND	(0.40)	ND	(0.40)	ND	(0.40)
1,3-Dichlorobenzene	400.0(G)		ND	(0.40)	ND	(0.40)	ND	(0.40)
1,4-Dichlorobenzene	750.0(M)	750.0(G)	ND	(0.30)	5.2	(0.30)	5.1	(0.30)
Benzene	5.0(M)	0.0(G)	ND	(0.20)	ND	(0.20)	0.30	(0.20)
Chlorobenzene	60.0(G)		ND	(0.30)	ND	(0.30)	ND	(0.30)
Ethylbenzene	680.0(G)		ND	(0.30)	ND	(0.30)	ND	(0.30)
Toluene	2000.0(G)		1.8	(0.20)	47.0	(0.20)	1.0	(0.20)
m-Xylene			ND	(0.20)	ND	(0.20)	ND	(0.20)
o-Xylene			ND	(0.10)	ND	(0.10)	ND	(0.10)
p-Xylene			ND	(0.20)	ND	(0.20)	NDQ	(0.20)

EPA Standards and Criteria are designated: M-Maximum Contaminant Level (MCL), G-Maximum Contaminant Level Goal (MCLG) or other secondary or proposed standard (Refer to Tables 4.1-1 and 4.1-2).

&: cis-1,3-Dichloropropene cannot be quantitated due to coelution.

Q: Daily EPA QC recovery outside 95% confidence limit.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth							
	12D 12D-4 19-Feb-88 15 - 20		12D 12D-6 19-Feb-88 25 - 30		12E 12E-2 23-Feb-88 4 - 6		12E 12E-4 23-Feb-88 14 - 19	
Petroleum Hydrocarbons MG/KG								
Petroleum Hydrocarbons	ND	(5.0)	ND	(2.0)	ND	(5.0)	14.0	
Volatile Organic Compounds MG/KG								
1,1,1-trichloroethane	ND	(0.0040)	ND	(0.0045)	ND	(0.0044)	ND	(0.0039)
1,1,2,2-tetrachloroethane	ND	(0.0073)	ND	(0.0081)	ND	(0.0080)	ND	(0.0071)
1,1,2-trichloroethane	ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
1,2-dichloroethane	ND	(0.0030)	ND	(0.0033)	ND	(0.0032)	ND	(0.0029)
1,2-dichloropropane	ND	(0.0064)	ND	(0.0071)	ND	(0.0070)	ND	(0.0062)
2-butanone	ND	(0.027)	ND	(0.030)	ND	(0.029)	ND	(0.026)
2-chloroethylvinyl ether	ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
2-hexanone	ND	(0.038)	ND	(0.042)	ND	(0.042)	ND	(0.037)
4-methyl-2-pentanone	ND	(0.049)	ND	(0.054)	ND	(0.053)	ND	(0.047)
Benzene	ND	(0.0047)	ND	(0.0052)	ND	(0.0051)	ND	(0.0045)
Ethylbenzene	ND	(0.0076)	ND	(0.0085)	ND	(0.0084)	ND	(0.0074)
Toluene	ND	(0.0064)	0.029	(0.0071)	0.018	(0.0070)	0.0019J	(0.0062)
Trichloroethene	ND	(0.0020)	ND	(0.0022)	ND	(0.0022)	ND	(0.0020)
acetone	0.011B	(0.0080)	0.014B	(0.0089)	0.012B	(0.0087)	0.015B	(0.0077)
bromodichloromethane	ND	(0.0023)	ND	(0.0026)	ND	(0.0026)	ND	(0.0023)
bromoform	ND	(0.0050)	ND	(0.0055)	ND	(0.0055)	ND	(0.0048)
bromomethane	ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
carbon disulfide	ND	(0.0018)	ND	(0.0020)	ND	(0.0020)	ND	(0.0018)
carbon tetrachloride	ND	(0.0030)	ND	(0.0033)	ND	(0.0032)	ND	(0.0029)
chlorobenzene	ND	(0.0064)	ND	(0.0071)	ND	(0.0070)	ND	(0.0062)
chloroethane	ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well							
	Sample ID	12D-4		12D-6		12E-2		12E-4	
	Date Sampled	19-Feb-88		19-Feb-88		23-Feb-88		23-Feb-88	
	Beg. Depth - End Depth	15 - 20		25 - 30		4 - 6		14 - 19	
chloroform		ND	(0.0017)	ND	(0.0019)	ND	(0.0019)	ND	(0.0016)
chloromethane		ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
cis-1,3-Dichloropropene		ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
dibromochloromethane		ND	(0.0033)	ND	(0.0037)	ND	(0.0036)	ND	(0.0032)
methylene chloride		ND	(0.0030)	ND	(0.0033)	ND	(0.0032)	ND	(0.0029)
styrene		ND	(0.0032)	ND	(0.0035)	ND	(0.0035)	ND	(0.0031)
tetrachloroethene		ND	(0.0043)	ND	(0.0048)	ND	(0.0048)	ND	(0.0042)
total xylenes		ND	(0.0049)	ND	(0.0054)	ND	(0.0053)	ND	(0.0047)
trans-1,2-Dichloroethene		ND	(0.0017)	ND	(0.0019)	ND	(0.0019)	ND	(0.0016)
trans-1,3-Dichloropropene		ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
trichlorofluoromethane		ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
vinyl acetate		ND	(0.0073)	ND	(0.0081)	ND	(0.0080)	ND	(0.0071)
vinyl chloride		ND	(0.0053)	ND	(0.0059)	ND	(0.0058)	ND	(0.0052)
Semivolatile Organic Compounds MG/KG									
1,2,4-trichlorobenzene		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
1,2-dichlorobenzene		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
1,3-dichlorobenzene		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
1,4-dichlorobenzene		ND	(0.30)	ND	(0.34)	ND	(0.40)	ND	(0.35)
2,4,5-trichlorophenol		ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
2,4,6-trichlorophenol		ND	(0.18)	ND	(0.21)	ND	(0.25)	ND	(0.21)
2,4-dichlorophenol		ND	(0.18)	ND	(0.21)	ND	(0.25)	ND	(0.21)
2,4-dimethylphenol		ND	(0.18)	ND	(0.21)	ND	(0.25)	ND	(0.21)
2,4-dinitrophenol		ND	(2.9)	ND	(3.2)	ND	(3.8)	ND	(3.3)
2,4-dinitrotoluene		ND	(0.39)	ND	(0.44)	ND	(0.52)	ND	(0.45)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCE: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth							
	12D 12D-4 19-Feb-88 15 - 20		12D 12D-6 19-Feb-88 25 - 30		12E 12E-2 23-Feb-88 4 - 6		12E 12E-4 23-Feb-88 14 - 19	
2,6-dinitrotoluene	ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
2-chloronaphthalene	ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
2-chlorophenol	ND	(0.23)	ND	(0.25)	ND	(0.30)	ND	(0.26)
2-methylnaphthalene	ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
2-methylphenol	ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
2-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(4.6)	ND	(4.0)
2-nitrophenol	ND	(0.25)	ND	(0.28)	ND	(0.33)	ND	(0.29)
3,3'-dichlorobenzidine	ND	(1.1)	ND	(1.3)	ND	(1.5)	ND	(1.3)
3-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(4.6)	ND	(4.0)
4,6-dinitro-2-methylphenol	ND	(1.6)	ND	(1.9)	ND	(2.2)	ND	(1.9)
4-bromophenyl-phenylether	ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
4-chloro-3-methylphenol	ND	(0.21)	ND	(0.23)	ND	(0.27)	ND	(0.24)
4-chloroaniline	ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
4-chlorophenyl-phenylether	ND	(0.29)	ND	(0.32)	ND	(0.38)	ND	(0.33)
4-methylphenol	ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
4-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(4.6)	ND	(4.0)
4-nitrophenol	ND	(0.16)	ND	(0.19)	ND	(0.22)	ND	(0.19)
acenaphthene	ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
acenaphthylene	ND	(0.24)	ND	(0.27)	ND	(0.32)	ND	(0.28)
aniline	ND	(0.68)	ND	(0.77)	ND	(0.91)	ND	(0.79)
anthracene	ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
benzidine	ND	(3.0)	ND	(3.4)	ND	(4.0)	ND	(3.5)
benzo(a)anthracene	ND	(0.53)	ND	(0.60)	ND	(0.71)	ND	(0.62)
benzo(a)pyrene	ND	(0.17)	ND	(0.19)	ND	(0.23)	ND	(0.20)
benzo(b)fluoranthene	ND	(0.33)	ND	(0.37)	ND	(0.44)	ND	(0.38)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well		12D		12E		12E	
	Sample ID		12D-4		12D-6		12E-2	12E-4
	Date Sampled		19-Feb-88		19-Feb-88		23-Feb-88	23-Feb-88
	Beg. Depth - End Depth		15 - 20		25 - 30		4 - 6	14 - 19
benzo(k)fluoranthene			ND	(0.17)	ND	(0.19)	ND (0.23)	ND (0.20)
benzoic acid			ND	(3.4)	ND	(3.9)	ND (4.6)	ND (4.0)
benzyl alcohol			ND	(3.4)	ND	(3.9)	ND (4.6)	ND (4.0)
bis(2-chloroethoxy)methane			ND	(0.36)	ND	(0.41)	ND (0.48)	ND (0.42)
bis(2-chloroethyl) ether			ND	(0.39)	ND	(0.44)	ND (0.52)	ND (0.45)
bis(2-chloroisopropyl)ether			ND	(0.39)	ND	(0.44)	ND (0.52)	ND (0.45)
bis(2-ethylhexyl)phthalate			ND	(0.17)	0.15BJ	(0.19)	0.11J (0.23)	0.16J (0.20)
butylbenzylphthalate			ND	(0.17)	ND	(0.19)	ND (0.23)	ND (0.20)
chrysene			ND	(0.17)	ND	(0.19)	ND (0.23)	ND (0.20)
di-n-butylphthalate			0.21	(0.17)	0.096J	(0.19)	0.15BJ (0.23)	0.25B (0.20)
di-n-octyl phthalate			ND	(0.17)	ND	(0.19)	0.10J (0.23)	ND (0.20)
dibenzo(a,h)anthracene			ND	(0.17)	ND	(0.19)	ND (0.23)	ND (0.20)
dibenzofuran			ND	(0.68)	ND	(0.77)	ND (0.91)	ND (0.79)
diethylphthalate			ND	(0.13)	ND	(0.15)	ND (0.17)	ND (0.15)
dimethyl phthalate			ND	(0.11)	ND	(0.12)	ND (0.15)	ND (0.13)
fluoranthene			ND	(0.15)	ND	(0.17)	ND (0.20)	ND (0.17)
fluorene			ND	(0.13)	ND	(0.15)	ND (0.17)	ND (0.15)
hexachlorobenzene			ND	(0.13)	ND	(0.15)	ND (0.17)	ND (0.15)
hexachlorobutadiene			ND	(0.062)	ND	(0.069)	ND (0.082)	ND (0.071)
hexachlorocyclopentadiene			ND	(0.41)	ND	(0.46)	ND (0.55)	ND (0.48)
hexachloroethane			ND	(0.11)	ND	(0.12)	ND (0.15)	ND (0.13)
indeno(1,2,3-cd)pyrene			ND	(0.25)	ND	(0.29)	ND (0.34)	ND (0.29)
isophorone			ND	(0.15)	ND	(0.17)	ND (0.20)	ND (0.17)
n-nitroso-di-n-propylamine			ND	(0.82)	ND	(0.93)	ND (1.1)	ND (0.95)
n-nitrosodimethylamine			ND	(0.68)	ND	(0.77)	ND (0.91)	ND (0.79)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well							
	Sample ID	12D-4		12D-6		12E-2		12E-4	
	Date Sampled	19-Feb-88		19-Feb-88		23-Feb-88		23-Feb-88	
	Beg. Depth - End Depth	15 - 20		25 - 30		4 - 6		14 - 19	
n-nitrosodiphenylamine		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
naphthalene		ND	(0.11)	ND	(0.12)	ND	(0.15)	ND	(0.13)
nitrobenzene		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)
pentachlorophenol		ND	(0.25)	ND	(0.28)	ND	(0.33)	ND	(0.29)
phenanthrene		ND	(0.37)	ND	(0.42)	ND	(0.49)	ND	(0.43)
phenol		ND	(0.10)	ND	(0.12)	ND	(0.14)	ND	(0.12)
pyrene		ND	(0.13)	ND	(0.15)	ND	(0.17)	ND	(0.15)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well Sample ID Date Sampled Beg. Depth - End Depth 12E 12E-6 23-Feb-88 24 - 29		12G 12G-4 20-Feb-88 14 - 17		12H 12H-1 23-Feb-88 0 - 4	
Petroleum Hydrocarbons MG/KG						
Petroleum Hydrocarbons	ND	(5.0)	ND	(5.0)	3230.0	
Volatile Organic Compounds MG/KG						
1,1,1-trichloroethane	ND	(0.0040)	ND	(0.0044)	ND	(0.95)
1,1,2,2-tetrachloroethane	ND	(0.0072)	ND	(0.0079)	ND	(1.7)
1,1,2-trichloroethane	ND	(0.0053)	ND	(0.0058)	ND	(1.3)
1,2-dichloroethane	ND	(0.0029)	ND	(0.0032)	ND	(0.70)
1,2-dichloropropane	ND	(0.0063)	ND	(0.0069)	ND	(1.5)
2-butanone	ND	(0.026)	ND	(0.029)	3.6BJ	(6.3)
2-chloroethylvinyl ether	ND	(0.0053)	ND	(0.0058)	ND	(1.3)
2-hexanone	ND	(0.038)	ND	(0.041)	ND	(9.0)
4-methyl-2-pentanone	ND	(0.048)	ND	(0.053)	ND	(12.0)
Benzene	ND	(0.0046)	ND	(0.0051)	0.37J	(1.1)
Ethylbenzene	ND	(0.0076)	ND	(0.0083)	4.1	(1.8)
Toluene	0.0042J	(0.0063)	0.019	(0.0069)	11.0	(1.5)
Trichloroethene	ND	(0.0020)	ND	(0.0022)	ND	(0.48)
acetone	0.029B	(0.0079)	0.015B	(0.0086)	0.74BJ	(1.9)
bromodichloromethane	ND	(0.0023)	ND	(0.0025)	ND	(0.55)
bromoform	ND	(0.0049)	ND	(0.0054)	ND	(1.2)
bromomethane	ND	(0.0053)	ND	(0.0058)	ND	(1.3)
carbon disulfide	ND	(0.0018)	ND	(0.0020)	ND	(0.43)
carbon tetrachloride	ND	(0.0029)	ND	(0.0032)	ND	(0.70)
chlorobenzene	ND	(0.0063)	ND	(0.0069)	ND	(1.5)
chloroethane	ND	(0.0053)	ND	(0.0058)	ND	(1.3)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well	12E		12G		12H	
	Sample ID	12E-6		12G-4		12H-1	
	Date Sampled	23-Feb-88		20-Feb-88		23-Feb-88	
	Beg. Depth - End Depth	24 - 29		14 - 17		0 - 4	
chloroform		ND	(0.0017)	ND	(0.0018)	ND	(0.40)
chloromethane		ND	(0.0053)	ND	(0.0058)	ND	(1.3)
cis-1,3-Dichloropropene		ND	(0.0053)	ND	(0.0058)	ND	(1.3)
dibromochloromethane		ND	(0.0033)	ND	(0.0036)	ND	(0.78)
methylene chloride		ND	(0.0029)	ND	(0.0032)	ND	(0.70)
styrene		ND	(0.0032)	ND	(0.0035)	ND	(0.75)
tetrachloroethene		ND	(0.0043)	ND	(0.0047)	ND	(1.0)
total xylenes		ND	(0.0048)	ND	(0.0053)	32.0	(1.2)
trans-1,2-Dichloroethene		ND	(0.0017)	ND	(0.0018)	ND	(0.40)
trans-1,3-Dichloropropene		ND	(0.0053)	ND	(0.0058)	ND	(1.3)
trichlorofluoromethane		ND	(0.0053)	ND	(0.0058)	ND	(1.3)
vinyl acetate		ND	(0.0072)	ND	(0.0079)	ND	(1.7)
vinyl chloride		ND	(0.0053)	ND	(0.0058)	ND	(1.3)
Semivolatile Organic Compounds MG/KG							
1,2,4-trichlorobenzene		ND	(0.17)	ND	(0.18)	ND	(0.22)
1,2-dichlorobenzene		ND	(0.17)	ND	(0.18)	ND	(0.22)
1,3-dichlorobenzene		ND	(0.17)	ND	(0.18)	ND	(0.22)
1,4-dichlorobenzene		ND	(0.39)	ND	(0.41)	ND	(0.51)
2,4,5-trichlorophenol		ND	(0.89)	ND	(0.92)	ND	(1.2)
2,4,6-trichlorophenol		ND	(0.24)	ND	(0.25)	ND	(0.32)
2,4-dichlorophenol		ND	(0.24)	ND	(0.25)	ND	(0.32)
2,4-dimethylphenol		ND	(0.24)	ND	(0.25)	ND	(0.32)
2,4-dinitrophenol		ND	(3.8)	ND	(3.9)	ND	(4.9)
2,4-dinitrotoluene		ND	(0.51)	ND	(0.53)	ND	(0.67)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
Sample ID	12E		12G		12H	
Date Sampled	12E-6		12G-4		12H-1	
Beg. Depth - End Depth	23-Feb-88		20-Feb-88		23-Feb-88	
	24 - 29		14 - 17		0 - 4	
2,6-dinitrotoluene	ND	(0.17)	ND	(0.18)	ND	(0.22)
2-chloronaphthalene	ND	(0.17)	ND	(0.18)	ND	(0.22)
2-chlorophenol	ND	(0.30)	ND	(0.30)	ND	(0.39)
2-methylnaphthalene	ND	(0.89)	ND	(0.92)	8.7	(1.2)
2-methylphenol	ND	(0.89)	ND	(0.92)	ND	(1.2)
2-nitroaniline	ND	(4.5)	ND	(4.6)	ND	(5.8)
2-nitrophenol	ND	(0.32)	ND	(0.33)	ND	(0.42)
3,3'-dichlorobenzidine	ND	(1.5)	ND	(1.5)	ND	(1.9)
3-nitroaniline	ND	(4.5)	ND	(4.6)	ND	(5.8)
4,6-dinitro-2-methylphenol	ND	(2.1)	ND	(2.2)	ND	(2.8)
4-bromophenyl-phenylether	ND	(0.17)	ND	(0.18)	ND	(0.22)
4-chloro-3-methylphenol	ND	(0.27)	ND	(0.28)	ND	(0.35)
4-chloroaniline	ND	(0.89)	ND	(0.92)	ND	(1.2)
4-chlorophenyl-phenylether	ND	(0.38)	ND	(0.39)	ND	(0.49)
4-methylphenol	ND	(0.89)	ND	(0.92)	4.2	(1.2)
4-nitroaniline	ND	(4.5)	ND	(4.6)	ND	(5.8)
4-nitrophenol	ND	(0.21)	ND	(0.22)	ND	(0.28)
acenaphthene	ND	(0.17)	ND	(0.18)	ND	(0.22)
acenaphthylene	ND	(0.31)	ND	(0.32)	ND	(0.41)
aniline	ND	(0.89)	ND	(0.92)	ND	(1.2)
anthracene	ND	(0.17)	ND	(0.18)	ND	(0.22)
benzidine	ND	(3.9)	ND	(4.1)	ND	(5.1)
benzo(a)anthracene	ND	(0.70)	ND	(0.72)	ND	(0.91)
benzo(a)pyrene	ND	(0.22)	ND	(0.23)	ND	(0.29)
benzo(b)fluoranthene	ND	(0.43)	ND	(0.44)	ND	(0.56)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (QC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
Sample ID	12E		12G		12H	
	12E-6		12G-4		12H-1	
Date Sampled	23-Feb-88		20-Feb-88		23-Feb-88	
Beg. Depth - End Depth	24 - 29		14 - 17		0 - 4	
benzo(k)fluoranthene	ND	(0.22)	ND	(0.23)	ND	(0.29)
benzoic acid	ND	(4.5)	ND	(4.6)	ND	(5.8)
benzyl alcohol	ND	(4.5)	ND	(4.6)	ND	(5.8)
bis(2-chloroethoxy)methane	ND	(0.47)	ND	(0.49)	ND	(0.62)
bis(2-chloroethyl) ether	ND	(0.51)	ND	(0.53)	ND	(0.67)
bis(2-chloroisopropyl)ether	ND	(0.51)	ND	(0.53)	ND	(0.67)
bis(2-ethylhexyl)phthalate	0.094J	(0.22)	0.19J	(0.23)	0.53	(0.29)
butylbenzylphthalate	ND	(0.22)	ND	(0.23)	ND	(0.29)
chrysene	ND	(0.22)	ND	(0.23)	ND	(0.29)
di-n-butylphthalate	0.24B	(0.22)	0.31B	(0.23)	0.62B	(0.29)
di-n-octyl phthalate	0.092J	(0.22)	0.18J	(0.23)	0.15J	(0.29)
dibenzo(a,h)anthracene	ND	(0.22)	ND	(0.23)	ND	(0.29)
dibenzofuran	ND	(0.89)	ND	(0.92)	0.17J	(1.2)
diethylphthalate	ND	(0.17)	ND	(0.18)	ND	(0.22)
dimethyl phthalate	ND	(0.14)	ND	(0.15)	ND	(0.19)
fluoranthene	ND	(0.20)	ND	(0.20)	ND	(0.26)
fluorene	ND	(0.17)	ND	(0.18)	ND	(0.22)
hexachlorobenzene	ND	(0.17)	ND	(0.18)	ND	(0.22)
hexachlorobutadiene	ND	(0.080)	ND	(0.083)	ND	(0.11)
hexachlorocyclopentadiene	ND	(0.54)	ND	(0.55)	ND	(0.70)
hexachloroethane	ND	(0.14)	ND	(0.15)	ND	(0.19)
indeno(1,2,3-cd)pyrene	ND	(0.33)	ND	(0.34)	ND	(0.43)
isophorone	ND	(0.20)	ND	(0.20)	ND	(0.26)
n-nitroso-di-n-propylamine	ND	(1.1)	ND	(1.1)	ND	(1.4)
n-nitrosodimethylamine	ND	(0.89)	ND	(0.92)	ND	(1.2)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (QC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

	Monitor Well					
	Sample ID	12E		12G	12H	
	Date Sampled	12E-6		12G-4	12H-1	
	Beg. Depth - End Depth	23-Feb-88		20-Feb-88	23-Feb-88	
PARAMETER		24 - 29		14 - 17	0 - 4	
n-nitrosodiphenylamine		ND	(0.17)	ND (0.18)	ND	(0.22)
naphthalene		ND	(0.14)	ND (0.15)	3.9	(0.19)
nitrobenzene		ND	(0.17)	ND (0.18)	ND	(0.22)
pentachlorophenol		ND	(0.32)	ND (0.33)	ND	(0.42)
phenanthrene		ND	(0.48)	ND (0.50)	ND	(0.63)
phenol		ND	(0.13)	ND (0.14)	0.50	(0.18)
pyrene		ND	(0.17)	ND (0.18)	ND	(0.22)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (QC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID		Monitor Well / Sample ID		Monitor Well / Sample ID		Monitor Well / Sample ID	
	12H / 12H-2		12H / 12H-2		12H / 12H-3		12H / 12H-4	
	23-Feb-88		23-Feb-88		23-Feb-88		23-Feb-88	
	4 - 9		4 - 9		9 - 14		14 - 19	
Petroleum Hydrocarbons MG/KG								
Petroleum Hydrocarbons	2110.0		1200.0		450.0		340.0	
Volatile Organic Compounds MG/KG								
1,1,1-trichloroethane	ND	(0.95)	ND	(0.55)	ND	(0.56)	ND	(0.56)
1,1,2,2-tetrachloroethane	ND	(1.7)	ND	(1.0)	ND	(1.0)	ND	(1.0)
1,1,2-trichloroethane	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
1,2-dichloroethane	ND	(0.70)	ND	(0.41)	ND	(0.41)	ND	(0.41)
1,2-dichloropropane	ND	(1.5)	ND	(0.87)	ND	(0.88)	ND	(0.88)
2-butanone	4.3BJ	(6.3)	5.1B	(3.6)	8.0B	(3.7)	5.7B	(3.7)
2-chloroethylvinyl ether	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
2-hexanone	ND	(9.0)	ND	(5.2)	ND	(5.3)	ND	(5.3)
4-methyl-2-pentanone	ND	(12.0)	ND	(6.7)	ND	(6.8)	ND	(6.8)
Benzene	ND	(1.1)	ND	(0.64)	ND	(0.65)	ND	(0.65)
Ethylbenzene	4.8	(1.8)	3.6	(1.0)	1.1J	(1.1)	0.89J	(1.1)
Toluene	8.8	(1.5)	7.5	(0.87)	1.9	(0.88)	0.24J	(0.88)
Trichloroethene	ND	(0.48)	ND	(0.28)	ND	(0.28)	ND	(0.28)
acetone	4.0B	(1.9)	2.6B	(1.1)	2.5B	(1.1)	11.0B	(1.1)
bromodichloromethane	ND	(0.55)	ND	(0.32)	ND	(0.32)	ND	(0.32)
bromoform	ND	(1.2)	ND	(0.68)	ND	(0.69)	ND	(0.69)
bromomethane	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
carbon disulfide	ND	(0.43)	ND	(0.25)	ND	(0.25)	ND	(0.25)
carbon tetrachloride	ND	(0.70)	ND	(0.41)	ND	(0.41)	ND	(0.41)
chlorobenzene	ND	(1.5)	ND	(0.87)	ND	(0.88)	ND	(0.88)
chloroethane	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID		Monitor Well / Sample ID		Monitor Well / Sample ID		Monitor Well / Sample ID	
	12H / 12H-2		12H / 12H-2		12H / 12H-3		12H / 12H-4	
	Date Sampled: 23-Feb-88		Date Sampled: 23-Feb-88		Date Sampled: 23-Feb-88		Date Sampled: 23-Feb-88	
	Beg. Depth - End Depth: 4 - 9		Beg. Depth - End Depth: 4 - 9		Beg. Depth - End Depth: 9 - 14		Beg. Depth - End Depth: 14 - 19	
chloroform	ND	(0.40)	ND	(0.23)	ND	(0.24)	ND	(0.24)
chloromethane	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
cis-1,3-Dichloropropene	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
dibromochloromethane	ND	(0.78)	ND	(0.45)	ND	(0.46)	ND	(0.46)
methylene chloride	ND	(0.70)	ND	(0.41)	ND	(0.41)	ND	(0.41)
styrene	ND	(0.75)	ND	(0.44)	ND	(0.44)	ND	(0.44)
tetrachloroethene	ND	(1.0)	ND	(0.59)	ND	(0.60)	ND	(0.60)
total xylenes	31.0	(1.2)	23.0	(0.67)	6.4	(0.68)	4.0	(0.68)
trans-1,2-Dichloroethene	ND	(0.40)	ND	(0.23)	ND	(0.24)	ND	(0.24)
trans-1,3-Dichloropropene	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
trichlorofluoromethane	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
vinyl acetate	ND	(1.7)	ND	(1.0)	ND	(1.0)	ND	(1.0)
vinyl chloride	ND	(1.3)	ND	(0.73)	ND	(0.74)	ND	(0.74)
Semivolatile Organic Compounds MG/KG								
1,2,4-trichlorobenzene	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
1,2-dichlorobenzene	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
1,3-dichlorobenzene	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
1,4-dichlorobenzene	ND	(0.40)	ND	(0.40)	ND	(0.39)	ND	(0.40)
2,4,5-trichlorophenol	ND	(0.92)	ND	(0.91)	ND	(0.89)	ND	(0.92)
2,4,6-trichlorophenol	ND	(0.25)	ND	(0.25)	ND	(0.24)	ND	(0.25)
2,4-dichlorophenol	ND	(0.25)	ND	(0.25)	ND	(0.24)	ND	(0.25)
2,4-dimethylphenol	ND	(0.25)	ND	(0.25)	ND	(0.24)	ND	(0.25)
2,4-dinitrophenol	ND	(3.8)	ND	(3.8)	ND	(3.7)	ND	(3.9)
2,4-dinitrotoluene	ND	(0.52)	ND	(0.52)	ND	(0.51)	ND	(0.52)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID	Date Sampled	Beg. Depth - End Depth							
	12H / 12H-2	23-Feb-88	4 - 9		12H / 12H-2	23-Feb-88	4 - 9		12H / 12H-3	23-Feb-88	9 - 14		12H / 12H-4	23-Feb-88	14 - 19	
2,6-dinitrotoluene	ND	(0.17)			ND	(0.17)			ND	(0.17)			ND	(0.17)		
2-chloronaphthalene	ND	(0.17)			ND	(0.17)			ND	(0.17)			ND	(0.17)		
2-chlorophenol	ND	(0.30)			ND	(0.30)			ND	(0.29)			ND	(0.30)		
2-methylnaphthalene	4.0	(0.92)			4.8	(0.91)			0.66J	(0.89)			0.95	(0.92)		
2-methylphenol	ND	(0.92)			ND	(0.91)			ND	(0.89)			ND	(0.92)		
2-nitroaniline	ND	(4.6)			ND	(4.6)			ND	(4.4)			ND	(4.6)		
2-nitrophenol	ND	(0.33)			ND	(0.33)			ND	(0.32)			ND	(0.33)		
3,3'-dichlorobenzidine	ND	(1.5)			ND	(1.5)			ND	(1.5)			ND	(1.5)		
3-nitroaniline	ND	(4.6)			ND	(4.6)			ND	(4.4)			ND	(4.6)		
4,6-dinitro-2-methylphenol	ND	(2.2)			ND	(2.2)			ND	(2.1)			ND	(2.2)		
4-bromophenyl-phenylether	ND	(0.17)			ND	(0.17)			ND	(0.17)			ND	(0.17)		
4-chloro-3-methylphenol	ND	(0.27)			ND	(0.27)			ND	(0.27)			ND	(0.28)		
4-chloroaniline	ND	(0.92)			ND	(0.91)			ND	(0.89)			ND	(0.92)		
4-chlorophenyl-phenylether	ND	(0.38)			ND	(0.38)			ND	(0.37)			ND	(0.39)		
4-methylphenol	0.54J	(0.92)			0.76J	(0.91)			ND	(0.89)			ND	(0.92)		
4-nitroaniline	ND	(4.6)			ND	(4.6)			ND	(4.4)			ND	(4.6)		
4-nitrophenol	ND	(0.22)			ND	(0.22)			ND	(0.21)			ND	(0.22)		
acenaphthene	ND	(0.17)			ND	(0.17)			ND	(0.17)			ND	(0.17)		
acenaphthylene	ND	(0.32)			ND	(0.32)			ND	(0.31)			ND	(0.32)		
aniline	ND	(0.92)			ND	(0.91)			ND	(0.89)			ND	(0.92)		
anthracene	ND	(0.17)			ND	(0.17)			ND	(0.17)			ND	(0.17)		
benzidine	ND	(4.0)			ND	(4.0)			ND	(3.9)			ND	(4.0)		
benzo(a)anthracene	ND	(0.71)			ND	(0.71)			ND	(0.69)			ND	(0.72)		
benzo(a)pyrene	ND	(0.23)			ND	(0.23)			ND	(0.22)			ND	(0.23)		
benzo(b)fluoranthene	ND	(0.44)			ND	(0.44)			ND	(0.43)			ND	(0.44)		

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

	Monitor Well		12H		12H		12H	
	Sample ID		12H-2		12H-2		12H-3	12H-4
	Date Sampled		23-Feb-88		23-Feb-88		23-Feb-88	23-Feb-88
	Beg. Depth - End Depth		4 - 9		4 - 9		9 - 14	14 - 19
PARAMETER								
benzo(k)fluoranthene	ND	(0.23)	ND	(0.23)	ND	(0.22)	ND	(0.23)
benzoic acid	ND	(4.6)	ND	(4.6)	ND	(4.4)	ND	(4.6)
benzyl alcohol	ND	(4.6)	ND	(4.6)	ND	(4.4)	ND	(4.6)
bis(2-chloroethoxy)methane	ND	(0.48)	ND	(0.48)	ND	(0.47)	ND	(0.49)
bis(2-chloroethyl) ether	ND	(0.52)	ND	(0.52)	ND	(0.51)	ND	(0.52)
bis(2 chloroisopropyl)ether	ND	(0.52)	ND	(0.52)	ND	(0.51)	ND	(0.52)
bis(2-ethylhexyl)phthalate	0.28	(0.23)	0.33	(0.23)	1.1B	(0.22)	1.4B	(0.23)
butylbenzylphthalate	ND	(0.23)	ND	(0.23)	ND	(0.22)	ND	(0.23)
chrysene	ND	(0.23)	ND	(0.23)	ND	(0.22)	ND	(0.23)
di-n-butylphthalate	0.28B	(0.23)	0.61B	(0.23)	ND	(0.22)	ND	(0.23)
di-n-octyl phthalate	0.10J	(0.23)	0.22J	(0.23)	0.14BJ	(0.22)	ND	(0.23)
dibenzo(a,h)anthracene	ND	(0.23)	ND	(0.23)	ND	(0.22)	ND	(0.23)
dibenzofuran	ND	(0.92)	ND	(0.91)	ND	(0.89)	ND	(0.92)
diethylphthalate	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
dimethyl phthalate	ND	(0.15)	ND	(0.15)	ND	(0.14)	ND	(0.15)
fluoranthene	ND	(0.20)	ND	(0.20)	ND	(0.20)	ND	(0.20)
fluorene	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
hexachlorobenzene	ND	(0.17)	ND	(0.17)	ND	(0.17)	ND	(0.17)
hexachlorobutadiene	ND	(0.082)	ND	(0.082)	ND	(0.080)	ND	(0.083)
hexachlorocyclopentadiene	ND	(0.55)	ND	(0.55)	ND	(0.53)	ND	(0.55)
hexachloroethane	ND	(0.15)	ND	(0.15)	ND	(0.14)	ND	(0.15)
indeno(1,2,3-cd)pyrene	ND	(0.34)	ND	(0.34)	ND	(0.33)	ND	(0.34)
isophorone	ND	(0.20)	ND	(0.20)	ND	(0.20)	ND	(0.20)
n-nitroso-di-n-propylamine	ND	(1.1)	ND	(1.1)	ND	(1.1)	ND	(1.1)
n-nitrosodimethylamine	ND	(0.92)	ND	(0.91)	ND	(0.89)	ND	(0.92)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

	Monitor Well							
	Sample ID		12H		12H		12H	
	Date Sampled		12H-2		12H-2		12H-3	12H-4
	Beg. Depth - End Depth		23-Feb-88		23-Feb-88		23-Feb-88	23-Feb-88
PARAMETER			4 - 9		4 - 9		9 - 14	14 - 19
n-nitrosodiphenylamine			ND	(0.17)	ND	(0.17)	ND (0.17)	ND (0.17)
naphthalene			2.1	(0.15)	2.7	(0.15)	0.31 (0.14)	0.37 (0.15)
nitrobenzene			ND	(0.17)	ND	(0.17)	ND (0.17)	ND (0.17)
pentachlorophenol			ND	(0.33)	ND	(0.33)	ND (0.32)	ND (0.33)
phenanthrene			ND	(0.49)	ND	(0.49)	ND (0.48)	ND (0.50)
phenol			0.33	(0.14)	0.36	(0.14)	ND (0.13)	ND (0.14)
pyrene			ND	(0.17)	ND	(0.17)	ND (0.17)	ND (0.17)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth		12H / 12H-5 / 23-Feb-88 / 19 - 25		12I / 12I-2 / 23-Feb-88 / 4 - 9		12I / 12I-3 / 24-Feb-88 / 9 - 14	
Petroleum Hydrocarbons MG/KG								
Petroleum Hydrocarbons			5760.0		670.0^		450.0	
Volatile Organic Compounds MG/KG								
1,1,1-trichloroethane			ND	(2.4)	ND	(0.55)	ND	(0.55)
1,1,2,2-tetrachloroethane			1.3J	(4.3)	ND	(1.0)	ND	(0.99)
1,1,2-trichloroethane			ND	(3.1)	ND	(0.73)	ND	(0.72)
1,2-dichloroethane			ND	(1.8)	ND	(0.41)	ND	(0.40)
1,2-dichloropropane			ND	(3.8)	ND	(0.87)	ND	(0.86)
2-butanone			ND	(16.0)	5.0B	(3.6)	6.0B	(3.6)
2-chloroethylvinyl ether			ND	(3.1)	ND	(0.73)	ND	(0.72)
2-hexanone			ND	(23.0)	ND	(5.2)	ND	(5.2)
4-methyl-2-pentanone			ND	(29.0)	ND	(6.7)	ND	(6.6)
Benzene			ND	(2.8)	ND	(0.64)	0.54J	(0.63)
Ethylbenzene			5.0	(4.5)	1.3	(1.0)	5.6	(1.0)
Toluene			3.7J	(3.8)	1.7	(0.87)	2.2	(0.86)
Trichloroethene			ND	(1.2)	ND	(0.28)	ND	(0.27)
acetone			0.87BJ	(4.7)	8.2B	(1.1)	5.4B	(1.1)
bromodichloromethane			ND	(1.4)	ND	(0.32)	ND	(0.32)
bromoform			ND	(2.9)	ND	(0.68)	ND	(0.68)
bromomethane			ND	(3.1)	ND	(0.73)	ND	(0.72)
carbon disulfide			ND	(1.1)	ND	(0.25)	ND	(0.24)
carbon tetrachloride			ND	(1.8)	ND	(0.41)	ND	(0.40)
chlorobenzene			ND	(3.8)	ND	(0.87)	ND	(0.86)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

^: Indicates duplicate analysis is not within control limits.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
	12H		12I		12I	
Sample ID	12H-5		12I-2		12I-3	
Date Sampled	23-Feb-88		23-Feb-88		24-Feb-88	
Beg. Depth - End Depth	19 - 25		4 - 9		9 - 14	
chloroethane	ND	(3.1)	ND	(0.73)	ND	(0.72)
chloroform	ND	(1.0)	ND	(0.23)	ND	(0.23)
chloromethane	ND	(3.1)	ND	(0.73)	ND	(0.72)
cis-1,3-Dichloropropene	ND	(3.1)	ND	(0.73)	ND	(0.72)
dibromochloromethane	ND	(1.9)	ND	(0.45)	ND	(0.45)
methylene chloride	ND	(1.8)	ND	(0.41)	ND	(0.40)
styrene	ND	(1.9)	ND	(0.44)	ND	(0.43)
tetrachloroethene	ND	(2.6)	ND	(0.59)	ND	(0.59)
total xylenes	32.0	(2.9)	8.6	(0.67)	35.0	(0.66)
trans-1,2-Dichloroethene	ND	(1.0)	ND	(0.23)	ND	(0.23)
trans-1,3-Dichloropropene	ND	(3.1)	ND	(0.73)	ND	(0.72)
trichlorofluoromethane	ND	(3.1)	ND	(0.73)	ND	(0.72)
vinyl acetate	ND	(4.3)	ND	(1.0)	ND	(0.99)
vinyl chloride	ND	(3.1)	ND	(0.73)	ND	(0.72)
Semivolatile Organic Compounds MG/KG						
1,2,4-trichlorobenzene	ND	(1.4)	ND	(0.15)	ND	(0.15)
1,2-dichlorobenzene	ND	(1.4)	ND	(0.15)	ND	(0.15)
1,3-dichlorobenzene	ND	(1.4)	ND	(0.15)	ND	(0.15)
1,4-dichlorobenzene	ND	(3.3)	ND	(0.35)	ND	(0.35)
2,4,5-trichlorophenol	ND	(7.6)	ND	(0.80)	ND	(0.79)
2,4,6-trichlorophenol	ND	(2.0)	ND	(0.22)	ND	(0.21)
2,4-dichlorophenol	ND	(2.0)	ND	(0.22)	ND	(0.21)
2,4-dimethylphenol	ND	(2.0)	ND	(0.22)	ND	(0.21)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (QC test codes)

^: Indicates duplicate analysis is not within control limits.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
	Sample ID	12H		12I	12I	
	Date Sampled	12H-5		12I-2	12I-3	
	Beg. Depth - End Depth	23-Feb-88		23-Feb-88	24-Feb-88	
		19 - 25		4 - 9	9 - 14	
2,4-dinitrophenol		ND	(32.0)	ND (3.4)	ND	(3.3)
2,4-dinitrotoluene		ND	(4.3)	ND (0.45)	ND	(0.45)
2,6-dinitrotoluene		ND	(1.4)	ND (0.15)	ND	(0.15)
2-chloronaphthalene		ND	(1.4)	ND (0.15)	ND	(0.15)
2-chlorophenol		ND	(2.5)	ND (0.26)	ND	(0.26)
2-methylnaphthalene		11.0	(7.6)	2.0 (0.80)	2.0	(0.79)
2-methylphenol		ND	(7.6)	ND (0.80)	ND	(0.79)
2-nitroaniline		ND	(38.0)	ND (4.0)	ND	(3.9)
2-nitrophenol		ND	(2.7)	ND (0.29)	ND	(0.28)
3,3'-dichlorobenzidine		ND	(12.0)	ND (1.3)	ND	(1.3)
3-nitroaniline		ND	(38.0)	ND (4.0)	ND	(3.9)
4,6-dinitro-2-methylphenol		ND	(18.0)	ND (1.9)	ND	(1.9)
4-bromophenyl-phenylether		ND	(1.4)	ND (0.15)	ND	(0.15)
4-chloro-3-methylphenol		ND	(2.3)	ND (0.24)	ND	(0.24)
4-chloroaniline		ND	(7.6)	ND (0.80)	ND	(0.79)
4-chlorophenyl-phenylether		ND	(1.2)	ND (0.14)	ND	(0.33)
4-methylphenol		ND	(7.6)	1.4 (0.80)	0.26J	(0.79)
4-nitroaniline		ND	(38.0)	ND (4.0)	ND	(3.9)
4-nitrophenol		ND	(1.8)	ND (0.19)	ND	(0.19)
acenaphthene		ND	(1.4)	ND (0.15)	ND	(0.15)
acenaphthylene		ND	(2.6)	ND (0.28)	ND	(0.27)
aniline		ND	(7.6)	ND (0.80)	ND	(0.79)
anthracene		ND	(1.4)	ND (0.15)	ND	(0.15)
benzidine		ND	(33.0)	ND (3.5)	ND	(3.5)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

^: Indicates duplicate analysis is not within control limits.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
Sample ID	12H		12I		12I	
	12H-5		12I-2		12I-3	
Date Sampled	23-Feb-88		23-Feb-88		24-Feb-88	
Beg. Depth - End Depth	19 - 25		4 - 9		9 - 14	
benzo(a)anthracene	ND	(5.9)	ND	(0.62)	ND	(0.61)
benzo(a)pyrene	ND	(1.9)	ND	(0.20)	ND	(0.20)
benzo(b)fluoranthene	ND	(3.6)	ND	(0.38)	ND	(0.38)
benzo(k)fluoranthene	ND	(1.9)	ND	(0.20)	ND	(0.20)
benzoic acid	ND	(38.0)	ND	(4.0)	ND	(3.9)
benzyl alcohol	ND	(38.0)	ND	(4.0)	ND	(3.9)
bis(2-chloroethoxy)methane	ND	(4.0)	ND	(0.42)	ND	(0.42)
bis(2-chloroethyl) ether	ND	(4.3)	ND	(0.45)	ND	(0.45)
bis(2-chloroisopropyl)ether	ND	(4.3)	ND	(0.45)	ND	(0.45)
bis(2-ethylhexyl)phthalate	12.0B	(1.9)	1.4B	(0.20)	0.58B	(0.20)
butylbenzylphthalate	ND	(1.9)	ND	(0.20)	ND	(0.20)
chrysene	ND	(1.9)	ND	(0.20)	ND	(0.20)
di-n-butylphthalate	ND	(1.9)	ND	(0.20)	ND	(0.20)
di-n-octyl phthalate	ND	(1.9)	0.21	(0.20)	0.47	(0.20)
dibenzo(a,h)anthracene	ND	(1.9)	ND	(0.20)	ND	(0.20)
dibenzofuran	ND	(7.6)	ND	(0.80)	ND	(0.79)
diethylphthalate	ND	(1.4)	ND	(0.15)	ND	(0.15)
dimethyl phthalate	ND	(1.2)	ND	(0.13)	ND	(0.13)
fluoranthene	ND	(1.7)	ND	(0.18)	ND	(0.17)
fluorene	ND	(1.4)	ND	(0.15)	ND	(0.15)
hexachlorobenzene	ND	(1.4)	ND	(0.15)	ND	(0.15)
hexachlorobutadiene	ND	(0.68)	ND	(0.072)	ND	(0.071)
hexachlorocyclopentadiene	ND	(4.5)	ND	(0.48)	ND	(0.47)
hexachloroethane	ND	(1.2)	ND	(0.13)	ND	(0.13)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

^: Indicates duplicate analysis is not within control limits.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
Sample ID	12H		12I		12I	
	12H-5		12I-2		12I-3	
Date Sampled	23-Feb-88		23-Feb-88		24-Feb-88	
Beg. Depth - End Depth	19 - 25		4 - 9		9 - 14	
Indeno(1,2,3-cd)pyrene	ND	(2.8)	ND	(0.30)	ND	(0.29)
Isophorone	ND	(1.7)	ND	(0.18)	ND	(0.17)
n-nitroso-di-n-propylamine	ND	(9.1)	ND	(0.96)	ND	(0.94)
n-nitrosodimethylamine	ND	(7.6)	ND	(0.80)	ND	(0.79)
n-nitrosodiphenylamine	ND	(1.4)	ND	(0.15)	ND	(0.15)
naphthalene	4.7	(1.2)	0.95	(0.13)	0.94	(0.13)
nitrobenzene	ND	(1.4)	ND	(0.15)	ND	(0.15)
pentachlorophenol	ND	(2.7)	ND	(0.29)	ND	(0.28)
phenanthrene	ND	(4.1)	ND	(0.43)	ND	(0.42)
phenol	ND	(1.1)	ND	(0.12)	ND	(0.12)
pyrene	ND	(1.4)	ND	(0.15)	ND	(0.15)

B: Detected in Reagent Blank; background subtraction not performed

BJ: Analyte detected in blank. Estimated value below detection limit.

J: Estimated value (GC test codes)

^: Indicates duplicate analysis is not within control limits.

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well Sample ID Date Sampled Beg. Depth - End Depth 12I 12I-5 24-Feb-88 19 - 24		12J 12J-2 24-Feb-88 4 - 9		12J 12J-2 24-Feb-88 4 - 9	
Petroleum Hydrocarbons MG/KG						
Petroleum Hydrocarbons	1250.0		ND	(5.0)	ND	(5.0)
Volatile Organic Compounds MG/KG						
1,1,1-trichloroethane	ND	(0.0039)	ND	(0.0045)	ND	(0.0044)
1,1,2,2-tetrachloroethane	ND	(0.0070)	ND	(0.0081)	ND	(0.0080)
1,1,2-trichloroethane	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
1,2-dichloroethane	ND	(0.0029)	ND	(0.0033)	ND	(0.0032)
1,2-dichloropropane	ND	(0.0061)	ND	(0.0071)	ND	(0.0070)
2-butanone	ND	(0.026)	ND	(0.030)	ND	(0.029)
2-chloroethylvinyl ether	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
2-hexanone	ND	(0.037)	ND	(0.042)	ND	(0.042)
4-methyl-2-pentanone	ND	(0.047)	0.023J	(0.054)	ND	(0.053)
Benzene	ND	(0.0045)	ND	(0.0052)	ND	(0.0051)
Ethylbenzene	ND	(0.0073)	ND	(0.0085)	ND	(0.0084)
Toluene	0.016	(0.0061)	0.0062J	(0.0071)	0.013	(0.0070)
Trichloroethene	ND	(0.0019)	ND	(0.0022)	ND	(0.0022)
acetone	0.057B	(0.0077)	ND	(0.0089)	0.035B	(0.0087)
bromodichloromethane	ND	(0.0022)	ND	(0.0026)	ND	(0.0026)
bromoform	ND	(0.0048)	ND	(0.0055)	ND	(0.0055)
bromomethane	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
carbon disulfide	ND	(0.0017)	ND	(0.0020)	ND	(0.0020)
carbon tetrachloride	ND	(0.0029)	ND	(0.0033)	ND	(0.0032)
chlorobenzene	ND	(0.0061)	ND	(0.0071)	ND	(0.0070)
chloroethane	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
chloroform	ND	(0.0016)	ND	(0.0019)	ND	(0.0019)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth					
	12I / 12I-5 / 24-Feb-88 / 19 - 24		12J / 12J-2 / 24-Feb-88 / 4 - 9		12J / 12J-2 / 24-Feb-88 / 4 - 9	
chloromethane	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
cis-1,3-Dichloropropene	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
dibromochloromethane	ND	(0.0032)	ND	(0.0037)	ND	(0.0036)
methylene chloride	0.0050	(0.0029)	0.12	(0.0033)	0.018	(0.0032)
styrene	ND	(0.0031)	ND	(0.0035)	ND	(0.0035)
tetrachloroethene	ND	(0.0042)	ND	(0.0048)	ND	(0.0048)
total xylenes	0.0063	(0.0047)	ND	(0.0054)	ND	(0.0053)
trans-1,2-Dichloroethene	ND	(0.0016)	ND	(0.0019)	ND	(0.0019)
trans-1,3-Dichloropropene	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
trichlorofluoromethane	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
vinyl acetate	ND	(0.0070)	ND	(0.0081)	ND	(0.0080)
vinyl chloride	ND	(0.0051)	ND	(0.0059)	ND	(0.0058)
Semivolatile Organic Compounds MG/KG						
1,2,4-trichlorobenzene	ND	(0.13)	ND	(0.15)	ND	(0.15)
1,2-dichlorobenzene	ND	(0.13)	ND	(0.15)	ND	(0.15)
1,3-dichlorobenzene	ND	(0.13)	ND	(0.15)	ND	(0.15)
1,4-dichlorobenzene	ND	(0.30)	ND	(0.35)	ND	(0.34)
2,4,5-trichlorophenol	ND	(0.69)	ND	(0.79)	ND	(0.77)
2,4,6-trichlorophenol	ND	(0.19)	ND	(0.21)	ND	(0.21)
2,4-dichlorophenol	ND	(0.19)	ND	(0.21)	ND	(0.21)
2,4-dimethylphenol	ND	(0.19)	ND	(0.21)	ND	(0.21)
2,4-dinitrophenol	ND	(2.9)	ND	(3.3)	ND	(3.2)
2,4-dinitrotoluene	ND	(0.39)	ND	(0.45)	ND	(0.44)
2,6-dinitrotoluene	ND	(0.13)	ND	(0.15)	ND	(0.15)
2-chloronaphthalene	ND	(0.13)	ND	(0.15)	ND	(0.15)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth					
	12I / 12I-5 / 24-Feb-88 / 19 - 24		12J / 12J-2 / 24-Feb-88 / 4 - 9		12J / 12J-2 / 24-Feb-88 / 4 - 9	
2-chlorophenol	ND	(0.23)	ND	(0.26)	ND	(0.25)
2-methylnaphthalene	0.84	(0.69)	ND	(0.79)	ND	(0.77)
2-methylphenol	ND	(0.69)	ND	(0.79)	ND	(0.77)
2-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(3.9)
2-nitrophenol	ND	(0.25)	ND	(0.28)	ND	(0.28)
3,3'-dichlorobenzidine	ND	(1.1)	ND	(1.3)	ND	(1.3)
3-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(3.9)
4,6-dinitro-2-methylphenol	ND	(1.6)	ND	(1.9)	ND	(1.8)
4-bromophenyl-phenylether	ND	(0.13)	ND	(0.15)	ND	(0.15)
4-chloro-3-methylphenol	ND	(0.21)	ND	(0.24)	ND	(0.23)
4-chloroaniline	ND	(0.69)	ND	(0.79)	ND	(0.77)
4-chlorophenyl-phenylether	ND	(0.29)	ND	(0.33)	ND	(0.32)
4-methylphenol	0.16J	(0.69)	ND	(0.79)	ND	(0.77)
4-nitroaniline	ND	(3.4)	ND	(3.9)	ND	(3.9)
4-nitrophenol	ND	(0.16)	ND	(0.19)	ND	(0.18)
acenaphthene	ND	(0.13)	ND	(0.15)	ND	(0.15)
acenaphthylene	ND	(0.24)	ND	(0.27)	ND	(0.27)
aniline	ND	(0.69)	ND	(0.79)	ND	(0.77)
anthracene	ND	(0.13)	ND	(0.15)	ND	(0.15)
benzidine	ND	(3.0)	ND	(3.5)	ND	(3.4)
benzo(a)anthracene	ND	(0.54)	ND	(0.61)	ND	(0.60)
benzo(a)pyrene	ND	(0.17)	ND	(0.20)	ND	(0.19)
benzo(b)fluoranthene	ND	(0.33)	ND	(0.38)	ND	(0.37)
benzo(k)fluoranthene	ND	(0.17)	ND	(0.20)	ND	(0.19)
benzoic acid	ND	(3.4)	ND	(3.9)	ND	(3.9)
benzyl alcohol	ND	(3.4)	ND	(3.9)	ND	(3.9)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
Sample ID	12I		12J		12J	
	12I-5		12J-2		12J-2	
Date Sampled	24-Feb-88		24-Feb-88		24-Feb-88	
Beg. Depth - End Depth	19 - 24		4 - 9		4 - 9	
bis(2-chloroethoxy)methane	ND	(0.36)	ND	(0.42)	ND	(0.41)
bis(2-chloroethyl) ether	ND	(0.39)	ND	(0.45)	ND	(0.44)
bis(2-chloroisopropyl)ether	ND	(0.39)	ND	(0.45)	ND	(0.44)
bis(2-ethylhexyl)phthalate	0.86B	(0.17)	ND	(0.20)	ND	(0.19)
butylbenzylphthalate	ND	(0.17)	ND	(0.20)	ND	(0.19)
chrysene	ND	(0.17)	ND	(0.20)	ND	(0.19)
di-n-butylphthalate	ND	(0.17)	ND	(0.20)	ND	(0.19)
di-n-octyl phthalate	0.095J	(0.17)	ND	(0.20)	ND	(0.19)
dibenzo(a,h)anthracene	ND	(0.17)	ND	(0.20)	ND	(0.19)
dibenzofuran	ND	(0.69)	ND	(0.79)	ND	(0.77)
diethylphthalate	ND	(0.13)	ND	(0.15)	ND	(0.15)
dimethyl phthalate	ND	(0.11)	ND	(0.13)	ND	(0.12)
fluoranthene	ND	(0.15)	ND	(0.17)	ND	(0.17)
fluorene	ND	(0.13)	ND	(0.15)	ND	(0.15)
hexachlorobenzene	ND	(0.13)	ND	(0.15)	ND	(0.15)
hexachlorobutadiene	ND	(0.062)	ND	(0.071)	ND	(0.069)
hexachlorocyclopentadiene	ND	(0.41)	ND	(0.47)	ND	(0.46)
hexachloroethane	ND	(0.11)	ND	(0.13)	ND	(0.12)
Indeno(1,2,3-cd)pyrene	ND	(0.25)	ND	(0.29)	ND	(0.28)
isophorone	ND	(0.15)	ND	(0.17)	ND	(0.17)
n-nitroso-di-n-propylamine	ND	(0.82)	ND	(0.94)	ND	(0.92)
n-nitrosodimethylamine	ND	(0.69)	ND	(0.79)	ND	(0.77)
n-nitrosodiphenylamine	ND	(0.13)	ND	(0.15)	ND	(0.15)
naphthalene	0.28	(0.11)	ND	(0.13)	ND	(0.12)
nitrobenzene	ND	(0.13)	ND	(0.15)	ND	(0.15)
pentachlorophenol	ND	(0.25)	ND	(0.28)	ND	(0.28)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well Sample ID Date Sampled Beg. Depth - End Depth	12I 12I-5 24-Feb-88 19 - 24		12J 12J-2 24-Feb-88 4 - 9		12J 12J-2 24-Feb-88 4 - 9	
phenanthrene		ND	(0.37)	ND	(0.42)	ND	(0.42)
phenol		ND	(0.10)	ND	(0.12)	ND	(0.12)
pyrene		ND	(0.13)	ND	(0.15)	ND	(0.15)

B: Detected in Reagent Blank; background subtraction not performed
J: Estimated value (GC test codes)
ND: Not detected at specified detection limit
( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
	Sample ID	12J-3		12J-5	12K-5	
	Date Sampled	24-Feb-88		24-Feb-88	20-Feb-88	
	Beg. Depth - End Depth	9 - 14		19 - 23	20 - 25	
Petroleum Hydrocarbons MG/KG						
Petroleum Hydrocarbons		ND	(6.0)	17.0	14.0	
Volatile Organic Compounds MG/KG						
1,1,1-trichloroethane		ND	(0.0045)	ND (0.0039)	ND	(0.0040)
1,1,2,2-tetrachloroethane		ND	(0.0081)	ND (0.0070)	ND	(0.0072)
1,1,2-trichloroethane		ND	(0.0059)	ND (0.0051)	ND	(0.0053)
1,2-dichloroethane		ND	(0.0033)	ND (0.0029)	ND	(0.0029)
1,2-dichloropropane		ND	(0.0071)	ND (0.0061)	ND	(0.0063)
2-butanone		ND	(0.030)	ND (0.026)	0.034	(0.026)
2-chloroethylvinyl ether		ND	(0.0059)	ND (0.0051)	ND	(0.0053)
2-hexanone		ND	(0.042)	ND (0.037)	ND	(0.038)
4-methyl-2-pentanone		ND	(0.054)	ND (0.047)	ND	(0.048)
Benzene		ND	(0.0052)	ND (0.0045)	ND	(0.0046)
Ethylbenzene		ND	(0.0085)	ND (0.0073)	ND	(0.0076)
Toluene		ND	(0.0071)	0.0064 (0.0061)	0.0011J	(0.0063)
Trichloroethene		ND	(0.0022)	ND (0.0019)	ND	(0.0020)
acetone		0.016B	(0.0089)	0.014B (0.0077)	0.013B	(0.0079)
bromodichloromethane		ND	(0.0026)	ND (0.0022)	ND	(0.0023)
bromoform		ND	(0.0055)	ND (0.0048)	ND	(0.0049)
bromomethane		ND	(0.0059)	ND (0.0051)	ND	(0.0053)
carbon disulfide		ND	(0.0020)	ND (0.0017)	ND	(0.0018)
carbon tetrachloride		ND	(0.0033)	ND (0.0029)	ND	(0.0029)
chlorobenzene		ND	(0.0071)	ND (0.0061)	ND	(0.0063)
chloroethane		ND	(0.0059)	ND (0.0051)	ND	(0.0053)
chloroform		ND	(0.0019)	ND (0.0016)	ND	(0.0017)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (QC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well		12J		12K	
	Sample ID		12J-3		12J-5	12K-5
	Date Sampled		24-Feb-88		24-Feb-88	20-Feb-88
	Beg. Depth - End Depth		9 - 14		19 - 23	20 - 25
chloromethane			ND	(0.0059)	ND (0.0051)	ND (0.0053)
cis-1,3-Dichloropropene			ND	(0.0059)	ND (0.0051)	ND (0.0053)
dibromochloromethane			ND	(0.0037)	ND (0.0032)	ND (0.0033)
methylene chloride			0.0039	(0.0033)	0.0062 (0.0029)	ND (0.0029)
styrene			ND	(0.0035)	ND (0.0031)	ND (0.0032)
tetrachloroethene			ND	(0.0048)	ND (0.0042)	ND (0.0043)
total xylenes			ND	(0.0054)	ND (0.0047)	ND (0.0048)
trans-1,2-Dichloroethene			ND	(0.0019)	ND (0.0016)	ND (0.0017)
trans-1,3-Dichloropropene			ND	(0.0059)	ND (0.0051)	ND (0.0053)
trichlorofluoromethane			ND	(0.0059)	ND (0.0051)	ND (0.0053)
vinyl acetate			ND	(0.0081)	ND (0.0070)	ND (0.0072)
vinyl chloride			ND	(0.0059)	ND (0.0051)	ND (0.0053)
Semivolatile Organic Compounds MG/KG						
1,2,4-trichlorobenzene			ND	(0.15)	ND (0.13)	ND (0.15)
1,2-dichlorobenzene			ND	(0.15)	ND (0.13)	ND (0.15)
1,3-dichlorobenzene			ND	(0.15)	ND (0.13)	ND (0.15)
1,4-dichlorobenzene			ND	(0.35)	ND (0.30)	ND (0.35)
2,4,5-trichlorophenol			ND	(0.80)	ND (0.69)	ND (0.79)
2,4,6-trichlorophenol			ND	(0.22)	ND (0.19)	ND (0.21)
2,4-dichlorophenol			ND	(0.22)	ND (0.19)	ND (0.21)
2,4-dimethylphenol			ND	(0.22)	ND (0.19)	ND (0.21)
2,4-dinitrophenol			ND	(3.4)	ND (2.9)	ND (3.3)
2,4-dinitrotoluene			ND	(0.46)	ND (0.39)	ND (0.45)
2,6-dinitrotoluene			ND	(0.15)	ND (0.13)	ND (0.15)
2-chloronaphthalene			ND	(0.15)	ND (0.13)	ND (0.15)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

	Monitor Well					
	Sample ID	12J		12J	12K	
	Date Sampled	12J-3		12J-5	12K-5	
	Beg. Depth - End Depth	24-Feb-88		24-Feb-88	20-Feb-88	
PARAMETER		9 - 14		19 - 23	20 - 25	
2-chlorophenol		ND	(0.26)	ND (0.23)	ND	(0.26)
2-methylnaphthalene		ND	(0.80)	ND (0.69)	ND	(0.79)
2-methylphenol		ND	(0.80)	ND (0.69)	ND	(0.79)
2-nitroaniline		ND	(4.0)	ND (3.5)	ND	(3.9)
2-nitrophenol		ND	(0.29)	ND (0.25)	ND	(0.28)
3,3'-dichlorobenzidine		ND	(1.3)	ND (1.1)	ND	(1.3)
3-nitroaniline		ND	(4.0)	ND (3.5)	ND	(3.9)
4,6-dinitro-2-methylphenol		ND	(1.9)	ND (1.7)	ND	(1.9)
4-bromophenyl-phenylether		ND	(0.15)	ND (0.13)	ND	(0.15)
4-chloro-3-methylphenol		ND	(0.24)	ND (0.21)	ND	(0.24)
4-chloroaniline		ND	(0.80)	ND (0.69)	ND	(0.79)
4-chlorophenyl-phenylether		ND	(0.34)	ND (0.29)	ND	(0.33)
4-methylphenol		ND	(0.80)	ND (0.69)	ND	(0.79)
4-nitroaniline		ND	(4.0)	ND (3.5)	ND	(3.9)
4-nitrophenol		ND	(0.19)	ND (0.17)	ND	(0.19)
acenaphthene		ND	(0.15)	ND (0.13)	ND	(0.15)
acenaphthylene		ND	(0.28)	ND (0.24)	ND	(0.28)
aniline		ND	(0.80)	ND (0.69)	ND	(0.79)
anthracene		ND	(0.15)	ND (0.13)	ND	(0.15)
benzidine		ND	(3.5)	ND (3.0)	ND	(3.5)
benzo(a)anthracene		ND	(0.62)	ND (0.54)	ND	(0.61)
benzo(a)pyrene		ND	(0.20)	ND (0.17)	ND	(0.20)
benzo(b)fluoranthene		ND	(0.38)	ND (0.33)	ND	(0.38)
benzo(k)fluoranthene		ND	(0.20)	ND (0.17)	ND	(0.20)
benzoic acid		ND	(4.0)	ND (3.5)	ND	(3.9)
benzyl alcohol		ND	(4.0)	ND (3.5)	ND	(3.9)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well / Sample ID / Date Sampled / Beg. Depth - End Depth					
	12J / 12J-3 / 24-Feb-88 / 9 - 14		12J / 12J-5 / 24-Feb-88 / 19 - 23		12K / 12K-5 / 20-Feb-88 / 20 - 25	
bis(2-chloroethoxy)methane	ND	(0.42)	ND	(0.37)	ND	(0.42)
bis(2-chloroethyl) ether	ND	(0.46)	ND	(0.39)	ND	(0.45)
bis(2-chloroisopropyl)ether	ND	(0.46)	ND	(0.39)	ND	(0.45)
bis(2-ethylhexyl)phthalate	ND	(0.20)	0.32B	(0.17)	0.12J	(0.20)
butylbenzylphthalate	ND	(0.20)	ND	(0.17)	ND	(0.20)
chrysene	ND	(0.20)	ND	(0.17)	ND	(0.20)
di-n-butylphthalate	ND	(0.20)	ND	(0.17)	ND	(0.20)
di-n-octyl phthalate	ND	(0.20)	ND	(0.17)	ND	(0.20)
dibenzo(a,h)anthracene	ND	(0.20)	ND	(0.17)	ND	(0.20)
dibenzofuran	ND	(0.80)	ND	(0.69)	ND	(0.79)
diethylphthalate	ND	(0.15)	ND	(0.13)	ND	(0.15)
dimethyl phthalate	ND	(0.13)	ND	(0.11)	ND	(0.13)
fluoranthene	ND	(0.18)	ND	(0.15)	ND	(0.17)
fluorene	ND	(0.15)	ND	(0.13)	ND	(0.15)
hexachlorobenzene	ND	(0.15)	ND	(0.13)	ND	(0.15)
hexachlorobutadiene	ND	(0.072)	ND	(0.062)	ND	(0.071)
hexachlorocyclopentadiene	ND	(0.48)	ND	(0.41)	ND	(0.47)
hexachloroethane	ND	(0.13)	ND	(0.11)	ND	(0.13)
indeno(1,2,3-cd)pyrene	ND	(0.30)	ND	(0.26)	ND	(0.29)
isophorone	ND	(0.18)	ND	(0.15)	ND	(0.17)
n-nitroso-di-n-propylamine	ND	(0.96)	ND	(0.83)	ND	(0.94)
n-nitrosodimethylamine	ND	(0.80)	ND	(0.69)	ND	(0.79)
n-nitrosodiphenylamine	ND	(0.15)	ND	(0.13)	ND	(0.15)
naphthalene	ND	(0.13)	ND	(0.11)	ND	(0.13)
nitrobenzene	ND	(0.15)	ND	(0.13)	ND	(0.15)
pentachlorophenol	ND	(0.29)	ND	(0.25)	ND	(0.28)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

Table 3.14-2 RESULTS OF ORGANIC ANALYSES FOR SOIL SAMPLES, SITE 12 (FDTA 2), CARSWELL AFB, TEXAS (Cont.)

Primary Results

PARAMETER	Monitor Well					
	Sample ID	12J		12J		12K
	Date Sampled	12J-3		12J-5		12K-5
	Beg. Depth - End Depth	24-Feb-88		24-Feb-88		20-Feb-88
		9 - 14		19 - 23		20 - 25
phenanthrene		ND	(0.43)	ND	(0.37)	ND	(0.42)
phenol		ND	(0.12)	ND	(0.10)	ND	(0.12)
pyrene		ND	(0.15)	ND	(0.13)	ND	(0.15)

B: Detected in Reagent Blank; background subtraction not performed

J: Estimated value (GC test codes)

ND: Not detected at specified detection limit

( ): Detection limit

SOURCES: Radian, 1990; ESE.

4. Removal and offsite incineration of the top 2 ft of contaminated soils within the 200-ft earthen berm.
5. Excavation of contaminated soil located within the 200-ft earthen berm to bedrock, followed by disposal of the contaminated soil in an approved landfill. The excavated area will then be filled with borrow material.
6. Excavation (and aeration) of the top 2 ft of soil, followed by vacuum extraction and aeration of deep soils in situ within the 200-ft earthen berm.
7. Excavation and landfilling of the top 2 ft of soil, vacuum extraction, and aeration of deep soils in situ within the 200-ft earthen berm.

Alternative 2 was selected based on the following criteria:

1. Site characteristics,
2. Cost,
3. Technical feasibility and effectiveness, and
4. Hazards to humans and the environment.

Table 3.14-3 shows the cost and feasibility of each alternative.

Summary of Permit Site (USACE, 1991)

This report briefly summarizes the project history for FTA-2. SWMU 19 was used for fire training exercises prior to 1963, SWMU 20 was used to store clean or contaminated fuel, and SWMU 21 was used for storage of waste oils and solvents. Five boreholes and five upper-zone monitor wells were installed at the site (no dates are reported).

Soil and groundwater samples were collected and analyzed for heavy metals, VOCs, and petroleum hydrocarbons. Selenium (30 to 70 mg/kg) was detected in three borings and lead (20 mg/kg) was detected in one boring. The detected

Table 3.14-3 NARRATIVE MATRIX
TECHNICAL EVALUATION OF ALTERNATIVES

Alternative	Cost[1] ($)	Engineering Feasibility	Regulatory Compliance
1. No action	0	----------	----------
2. Excavate top 2 ft/ aerate	27,000[2]	Proven technology	TWC approval necessary
3. Excavate top 2 ft/ landfill	93,000[2]	Proven technology	TWC approval necessary
4. Excavate top 2 ft/ incinerate	4,490,000[2]	Proven technology	TWC approval necessary
5. Excavate to bedrock/landfill	1,541,000[3]	Proven technology	TWC approval necessary
6. Excavate top 2 ft/ aerate/vacuum extraction	74,000	Proven technology	TWC approval necessary
7. Excavate top 2 ft/ landfill/vacuum extraction	140,000	Proven technology	TWC approval necessary

[1] Costs are based on a conceptual application of remedial technologies, and therefore should not be used for detailed budget planning purposes.

[2] Costs based on excavation and hauling of 2,328 yd^3 of contaminated soil.

[3] Cost based on excavation, hauling, and fill of 29,128 yd^3 of soil.

VOCs included 1,1,2,2-tetrachloroethane (1,300 μg/kg); benzene (370 μg/kg); total xylenes (37,000 μg/kg); and ethylbenzene (5,000 μg/kg).

Arsenic, lead, cadmium, chromium, TCE, tetrachloroethene, and vinyl chloride levels detected in the groundwater samples exceeded their respective MCLs. The findings of the Stage I investigation were confirmed later in the Stage 2 investigation. Based on the findings of the investigation, USACE proposed the submittal of a RAP at a later unspecified date.

90% Plans and Specifications--Site 12 (Radian, 1991)

Plans and specifications were prepared for work with the following principal features:

1. Remove and dispose of the dumpsters, aboveground storage tank, associated underground piping, and all remaining liquids in the tanks and piping.
2. The top 2 ft of overburden located within the limits of the outer berm will be removed and disposed of properly. The contractor will be responsible for obtaining soil samples from this material to determine the level of petroleum contamination. The sample results will govern the method of disposal.
3. The excavated area defined above will be backfilled with a low-permeability material.
4. All disturbed areas will be filled with topsoil and seeded.

90% Design Cost Estimate--Site 12 (Radian, 1991)

This report presented the design cost estimates for the following three alternatives for soil remediation at FTA-2:

Alternative A: If the soil results indicate a nondetectable level of TPH and a nondetectable level of BTEX, the contractor shall excavate the soil pile and dispose of or recycle the material outside the limits of CAFB in a

manner that complies with all local and state regulations.

Alternative B: If the soil sample results indicate TPH or BTEX levels between detectable levels and the Texas Department of Health (TDH) limits for disposal in a Class II facility, the contractor shall dispose of the soil pile in a TDH permitted Class II disposal facility designated by the contractor in the Materials Handling Plan. The contractor shall abide by all regulations set forth by TDH for disposal of petroleum-contaminated soil. The contractor shall also be responsible for obtaining any additional samples required by the disposal facility or TDH before removing the soil offsite.

Alternative C: If the soil sample results are greater than TDH's limits for TPH and BTEX for disposal in a Class II landfill, the contractor shall dispose of the contaminated soil in a Class *** , (sic) ***non-hazardous, TDH permitted facility designated in the Materials Handling Plan. The contractor shall abide by all regulations set forth by TDH for disposal of petroleum contaminated soil. The contractor shall be responsible for obtaining any additional samples required by the disposal facility or the TDH before removing the soil offsite.

The work performed includes the features presented in the report summarizing plans and specifications:

1. Remove and dispose of the dumpsters, aboveground storage tank, and associated underground piping.

2. The top 2 ft of overburden located within the limits of the outer berm shall be removed and disposed of properly. The contractor shall be responsible for obtaining soil samples from this material to determine the level of petroleum contamination. The sample results will govern the method of disposal.
3. The defined excavated area shall be backfilled with a low-permeability material.
4. All disturbed areas shall be filled with topsoil and seeded.

The costs include furnishing of all equipment, labor, and materials to perform work in strict accordance with the specifications, schedules, and drawings.

MAP, 1993

The MAP schedule projected that RA would be performed at FTA-2 in 1993, followed by a risk assessment and decision documents in 1994.

3.14.2 REMEDIATION PROJECT OBJECTIVES

Remediation project objectives include excavation of POL-contaminated soils followed by biological treatment (USACE, 1994).

3.14.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Approximately 5,700 yd^3 of POL-contaminated soils were excavated. Soils were treated biologically in an onsite treatment system for the purposes of reducing or eliminating levels of POL constituents in the soil.

3.14.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data/information developed from any portion of the remedial activities completed to date were identified in the project files.

3.14.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

The treatment conducted on the soils to date has only been for the purpose of removing POL constituents from the soils. Hazardous constituents are also present in the soil. The remedial activities conducted to date were initially intended to be a final remedial action. However, the state has commented that since hazardous constituents are also present in the soils, the remedial action is not complete with biological treatment alone. The state recommended the completion of a risk assessment to determine if the levels of hazardous constituents remaining in the soils warrant further action (USACE, 1994).

3.14.6 PROJECTS RESULTING FROM THE PROJECT

No projects were identified to result from the current remedial activities being performed at the site.

3.14.7 PROJECT STATUS

The excavation of contaminated soils has been completed; biological treatment of excavated soils is nearly complete (USACE, 1994).

3.14.8 SCHEDULE

No specific project schedule was available in the file material reviewed by ESE, with the exception of that noted in the MAP (see summary of MAP in Section 3.14-1). However, ESE was told that excavation activities were initiated in May 1993, followed by the startup of the biological treatment system in June 1993. The treatment of excavated soils is nearly complete.

3.14.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.14.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

The 90 percent documents for this site (the most recent available to ESE) specify removal and disposal of contaminated soils. However, contaminated soils are correctly being treated onsite.

3.15 USTs

As of March 1993, 71 USTs were at CAFB. The following sections include details on the status of these USTs.

3.15.1 SUMMARY OF REPORTS FOR USTs

Only one report (MAP for CAFB, 1993) addressed UST information for the 71 USTs at CAFB. The following paragraphs contain a description of the report, as it pertains to the USTs.

MAP for CAFB, 1993

Four UST removal projects were planned at CAFB. Two of these projects (which will remove six USTs) were funded and the other two projects (which will remove 40 USTs) were not funded. Of the remaining 25 USTs, seventeen will remain open for use by the 301st Fighter Wing (FW), five will be temporarily closed and turned over to the reuse authority, and three will remain open for use by the Air Force Base Disposal Agency (AFBDA). The status of the USTs as of March 1993 is presented in Table 3.15-1.

3.15.2 REMEDIATION PROJECT OBJECTIVES

The objectives of the remediation project were to remove 46 USTs and temporarily close five USTs (Table 3.15-1). No remediation was planned for the remaining 20 USTs. The objectives of the remedial actions required to remove the contaminated soils were not specified in the file material. The remedial actions for the UST sites are governed by the Texas UST Program.

Table 3.15-1. Underground Storage Tanks

Number	Facility	Contents	Status
9739	1015		To be removed
9718	1040		To be removed
9720	1050	#2 Fuel Oil	To be removed
	1064		Retained by 301st FW
	1064		Retained by 301st FW
	1064		Retained by 301st FW
	1064		Retained by 301st FW
	1191		Retained by 301st FW
9728	1194		Retained by 301st FW
9715	1411	Mogas	Retained by 301st FW
9715	1411		Retained by 301st FW
9715	1411		Retained by 301st FW
9727	1420		Retained by 301st FW
	1423		Retained by 301st FW
9730	1425		Retained by 301st FW
9721	1518		Scheduled to be removed
9721	1518		Scheduled to be removed
9737	1518		Scheduled to be removed
9721	1518		Scheduled to be removed
9721	1518		Scheduled to be removed
9716	1629		Retained by 301st FW
	1643		Retained by 301st FW
9696	1750		Scheduled to be removed
9729	3000	#2 Fuel Oil	Temporary closure
9729	3000	#2 Fuel Oil	Temporary closure

Table 3.15-1. Underground Storage Tanks (Continued, Page 2 of 3)

Number	Facility	Contents	Status
	3001		Scheduled to be removed
	3001		Scheduled to be removed
9705	3001		Temporary closure
	3190		Retained by 301st FW
9704	3359		Retained by 301st FW
9702	3360		Retained by 301st FW
	4102		To be removed
	4102		To be removed
9719	4111		To be removed
9710	4127		To be removed
9696	4136		Unknown
9707	4141		Use by AFBDA
9738	4143		Use by AFBDA
9703	4145		Use by AFBDA
9733	4150	JP-4	Scheduled to be removed
9733	4150	JP-4	Scheduled to be removed
9733	4150	JP-4	Scheduled to be removed
9733	4150	JP-4	Scheduled to be removed
9733	4150	JP-4	Scheduled to be removed
9733	4150	JP-4	Scheduled to be removed
9731	4152	JP-4	Scheduled to be removed
9731	4152	JP-4	Scheduled to be removed
9731	4152	JP-4	Scheduled to be removed
9731	4152	JP-4	Scheduled to be removed
9715	4152	JP-4	Scheduled to be removed

Table 3.15-1. Underground Storage Tanks (Continued, Page 3 of 3)

Number	Facility	Contents	Status
9731	4152	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9725	4153	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9723	4154	JP-4	Scheduled to be removed
9698	4155		To be removed
9701	4171		To be removed
9722	4205		To be removed
9737	4210		To be removed
9737	4210		To be removed
9737	4210		To be removed
9737	4210		To be removed
9737	4210		To be removed
9737	4210		To be removed
9717	4215		Temporary closure
9708	4216		Temporary closure

3/24/93/wp/F:72/3811/SEC-3.wp5

3.15.3 REMEDIATION ACCOMPLISHMENTS/RESULTS

Remediation projects were not accomplished as of March 1993. The schedules for the remediation projects are not available in the file material.

3.15.4 DATA/INFORMATION DEVELOPED AS A RESULT OF THE PROJECT

No data/information developed for the previously referenced sites were identified during the records review.

3.15.5 RECOMMENDATIONS FOR ADDITIONAL STUDIES AND/OR REMEDIATION

No recommendations for additional studies for the previously referenced sites were identified during the records review.

3.15.6 PROJECTS RESULTING FROM THE PROJECT

No projects resulting from this project were identified during the records review.

3.15.7 PROJECT STATUS

The removal of USTs was not completed as of March 1993.

3.15.8 SCHEDULE

The schedule for the removal of 46 USTs and the temporary closure of five USTs was not documented in the file material.

3.15.9 WHETHER OR NOT INFORMATION DERIVED IS IN IRPIMS

No data from this remediation project are in IRPIMS.

3.15.10 DISCREPANCIES BETWEEN VARIOUS PROJECT REPORTS

Only one report (MAP for CAFB, 1993) contains information regarding the status of the USTs at CAFB.

4.0 SUMMARY

Table 4.0-1 summarizes all the significant information for each of the fifteen remediation projects presented in Section 3.

Table 4.0-1. Summary of Remediation Projects at AFP4 and CAFB

Site Identification(s)	Remediation Project Objectives	Accomplishments for Groundwater	Accomplishments for Soil	Project Status	Project Schedule
Landfill No. 1 at AFP4 LF01 IRP Site No. 1	Objective of soils IRA was to remove approx. 10,700 yd^3 of soils from West Parking Lot. Objective of groundwater IRA was to recover leachate from the West Parking Lot excavation area.	Installation of French Drains No. 1 and 2, for the purposes of collecting leachate from the site. Groundwater is treated at FSA-1 system.	Removal of approximately 11,000 yd^3 of contaminated soils.	IRA for soils completed in 1983. French Drain No. 1 installed in 1982. French Drain No. 2 installed in 1984. Water from French Drains transmitted to FSA-1 treatment system; initiated in 1992.	MAP projects proposed plan for LF01 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.
Fire Department Training Area No. 6 at AFP4 FDTA-6 IRP Site No. 9	Objective of IRA was to remove a contaminant source.	None Reported	Removal of unspecified volume of contaminated soils in 1982 and 1983. Removal of an additional 170 yd^3 is specified.	IRA is complete. No status available for remaining 170 yd^3 specified for removal	IRA completed in 1983. No further schedule updates are available.
Chrome Pit No. 3 at AFP4 DP12 IRP Site No. 12	Objective of IRA was to remove a contaminant source.	None Reported	Removal of approximately 8,900 yd^3 of contaminated soils in 1983 and 1984. Further sampling to determine adequacy of removal is recommended.	IRA is complete. No status available for further sampling in the area.	IRA soils removal action is complete. MAP projects proposed plan for DP12 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.

Table 4.0-1. Summary of Remediation Projects at AFP4 and CAFB (Continued, Page 2 of 5)

Die Yard Chemical Pits at AFP4 DP13 IRP Site No. 13	Objective of IRA was to remove a contaminant source.	Interim Remedial Action of 1,100 cubic yards of soil. An additional 4,990 yd^3 of soils still require removal.	None reported.	IRA soils removal action complete in 1984. No status defined for 4,990 yd^3 requiring removal.	IRA completed in 1984. MAP projects proposed plan for DP13 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.
Fuel Saturation Area No. 1 at AFP4 SS14 IRP Site No. 14	Objective of IRA groundwater treatment system is to recover and treat contaminated groundwater. Objective of soil treatment system is to recover fuel vapors from soils.	Groundwater treatment system put into service in Oct. 1992. 70 gpm capacity. Consists of an oil/separator, air stripper, and two-10,000 pound carbon contactors. Two extraction wells. System also treats water from French Drains No. 1 and No. 2.	Soil vacuum extraction system put into service in Dec. 1992. System components not available in file material.	Groundwater treatment system in service. Performance evaluations are scheduled to optimize. Soil vacuum extraction system in service.	**No schedule available for groundwater or soil actions.** **MAP projects proposed plan for FSA-1 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.**
Fuel Saturation Area No. 3	Objective of IRA groundwater treatment system is to recover and treat contaminated groundwater. Objective of soil treatment system is to recover fuel vapors from soils.	Groundwater treatment system (30 gpm capacity) put into service in Oct. 1992. Consists of oil/water separator, and low-profile air stripper. Eight groundwater extraction wells in service.	IRA soil vacuum extraction system put into service in for several month during 1992. Pilot study data was collected. More permanent soil vacuum extraction system put into service in Dec. 1992. System components not available in file material.	Groundwater treatment system in service. Performance evaluations are scheduled to optimize. Soil vacuum extraction system in service.	MAP projects proposed plan for FSA-1 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.

Table 4.0-1. Summary of Remediation Projects at AFP4 and CAFB (Continued, Page 3 of 5)

Landfill No. 3 at AFP4 LF03 IRP Site No. 3	IRA objective was to recover product from groundwater at landfill.	Recovery estimated to be less than one-gallon of product recovery from DNAPL recovery well.	None reported.	DNAPL well was taken out of service after approximately one-year of operation. More specific information for recovery well is not available in the file material. Implementation of containment or vacuum extraction technologies are in advanced phases of planning.	MAP projects proposed plan for LF03 will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available. Field studies to assess feasibility of vacuum extraction scheduled for early 1994.
East Parking Lot Plume (Window Area) at AFP4 OT22 IRP Site No. 22	Extract and treat TCE contaminated groundwater; prevent transmission of contaminated groundwater from shallow aquifer to Paluxy. Recover groundwater seepage.	None Reported.	Window Area groundwater treatment system under construction. Consists of eight groundwater extraction wells, equalization basin, bag filters, air stripping (with carbon adsorption for air emissions) and carbon adsorption polishing. Taper Edge treatment system treats water that seeps into a deep pit in Building 181. Consists of low-profile air stripper.	System still in construction phase. System in operation. No further status information available.	Schedules for Window Area remediation and Taper Edge treatment system were not available in the file material.
Assembly Building/Parts Plant (181) at AFP4 AOC No IRP Site Number	Pilot study to evaluate effectiveness of soil vacuum extraction in removal of TCE from vadose zone.	None Reported.	Soil vacuum extraction pilot system was put into operation in December 1993. Consists of 7 extraction wells and two-3,000 pound carbon absorbers to treat emissions.	System scheduled to operate for 90 days. Pilot study report will be prepared.	System expected to operate through April 1, 1994. Pilot study report will be submitted 14-days after field testing is complete.

Table 4.0-1. Summary of Remediation Projects at AFP4 and CAFB (Continued, Page 4 of 5)

USTs 19 (ST25), 20 (ST26), 24A (ST27), 24B (ST28), 25A (ST29), and 30 (ST30) at AFP4 IRP Sit No.'s 25, 26, 27, 28, 29, and 30, respectively.	Objective of the completed remedial activities were to remove USTs 19, 20. 24a, 24b, 25a, and 30. Objectives of remedial actions required to remove contaminated soils was not specified in the file material. The UST sites are governed by the Texas UST Program.	None Reported.	USTs 19, 20, 24a, 24b, 25a, and 30 were removed in December 1988. The accomplishments/results of the remedial actions pertaining to contaminated soils at these sites is not documented in the file material.	Tanks have been removed. Status of contaminated soils is not documented in the file material.	MAP projects proposed plan for UST sites will be complete in Nov. 1993 with ROD final in June 1994. No further schedule updates are available.
Landfills No. 4 and No. 4 at CAFB LF04 and LF05 SWMU 22 and 23	Reduce or eliminate potential future impacts to human health and the environment and future contaminant migration.	Installation and operation of groundwater treatment system. Treatment system consists of 7 extraction wells, air stripping, and carbon adsorption.	None Reported.	System is in operation. Calcium carbonate fouling is inhibiting performance. Samples to be collected in Jan. 1994 to prove carbon polishing system is not necessary.	MAP projects proposed RD and DD documents to be completed in Sep. 1994. No further schedule updates are available.
POL Tank Farm at CAFB ST14 SWMU 68	Skimmer installed to recover product from groundwater at well where product was observed.	An oil skimmer was installed in April 1991. Schedule to be taken off-line in August 1993 due to insignificant product recover.	None Reported	System was scheduled to be taken offline in August 1993.	Oil skimmer was scheduled to be taken out of service in August 1993. File material did not contain information to note if this was accomplished. MAP projected RFA and NFA activities to be conducted during the period Dec. 1993 through Dec. 1994.

Table 4.0-1. Summary of Remediation Projects at AFP4 and CAFB (Continued, Page 5 of 5)

Waste Burial Area WP07 SWMU 24	Remove a contaminant source.	None Reported.	Buried drums and contaminated soils were removed between August and October 1991.	Not available.	MAP projects RD and DD activities to be conducted during the period April through Sep. 1994. RA to commence in Sep. 94.
Flightline Drainage Ditch SD10 SWMU 53	Remove contaminated soils and install culvert and concrete liner in ditch.	None Reported.	Approximately 700 yd^3 of contaminated soils were excavated. A culvert and concrete liner, totaling approximately 600 feet in length, was installed	Excavated soils have been stage onbase and are awaiting transportation to offsite disposal facility. The action was intended to be final. State of TX has not concurred and consider it IRA.	Excavation and channel reconstruction were complete as of December 1993. No schedule available for soils disposal or future actions.
Fire Training Area No. 2 FT09 SWMus 19, 20, and 21	Remove and treat POL contaminated soils.	None Reported.	Approximately 5,700 yd^3 of soils were excavated. Soils are currently being treated through an onsite biological treatment system.	Treatment of POL contaminated soils is nearly complete. Hazardous constituents, which were not planned to be removed during treatment, require further action. A risk assessment will be performed to determine if soils warrant further remediation.	Excavation was initiated May 1993. Treatment started in June 1993 and is nearly complete. The specific date for completion of treatment was not defined in the file material. No schedule for a risk assessment was available.
USTs at CAFB	Removal of 46 USTs	None Reported.	Not available in file information reviewed by ESE.	Not available in file material.	Not Reported.

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